Data Concentrators
Residential

Data Concentrator

DC450

User Manual

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Revision history

Version	Date	Comments
a	11.06.2010	First edition
b	09.02.2011	Updated to SW version 1.2.0
c	21.04.2011	Updated to the latest document template with minor corrections (e.g. deletion of protective earth)
d	18.07.2011	Updated Chapters *4.1.1* and *4.4*: Avoid installation on south-facing walls and direct sunshine
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f	25.05.2012	Updated to SW version 1.3.5 Added Chapter *8 Alarms*. Added Chapter *9 Events*. Added Chapter *10.3.5 Readings configuration*. Added a description of the PLC statistics snapshot feature to Chapter *10.4 Diagnostics.* Synchronised document version indicators.
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h	23.11.2012	Updated to SW version 1.4 Updated all screenshots Updated all Gridstream software application names. Reformatted all Notes, Cautions and Warnings. Updated *Figure 1. DC450 in the Gridstream system*. Added L1 to note in *4.5 Electricity network connection*. Added Chapter *5.2.1 Mounting*. Added Chapter *5.2.7 Meter response timeout (with RS-485 only)*. Added new alarms to Chapter *8 Alarms*. Updated list of Web UI pages in Chapter *10 Web interface*. Added PLC device count (max. number of metering devices) to Chapter *10.2 Web UI Main page*. Added MAC address ranges to *10.3.2 PLC configuration*. Added Chapter *10.3.4 Communication failure monitoring*. Added support for S650 active alarms to Chapter *10.3.6 Other configuration options*.

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1 About this document

Range of validity

The present user manual applies to the DC450 Data Concentrator.

Purpose

This document describes the installation and use of the DC450 Data Concentrator. For information on the hardware and software features of the concentrator, see *DC450 Data Concentrator Product Description.*

Target group

The contents of this user manual are intended for technically qualified personnel of energy supply companies responsible for the system planning, installation and commissioning, operation, maintenance, decommissioning and disposal of data concentrators.

Reference documents

This document is available in the following languages:

Language	Document number
English	D000031888
German	D000039125
Finnish	D000039115
Norwegian	D000040774
Polish	D000039232

The following documents provide more information related to the subject of this document:

- D000031887 “DC450 Product Description en”
- D000031889 “DC450 Technical Data en”

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Typographical conventions

The following typographical conventions are used throughout this document:

Font	Description
`Courier`	Font for file names, paths and code examples.
Bold	Font style used for menu items and buttons in user interface and for keys on keyboard.
Italics	Font style for new terminology and for references to other documents or other parts within this document. For example: “For more information on safety, see chapter *3 Safety information*.”

Terms and abbreviations

A list of terms and abbreviations used in this document is available at the end of this document.

2 Introduction

2.1 Key features and benefits of the DC450 data concentrator

DC450 data concentrator is an intelligent concentrator for large scale meter reading and controlling systems. The basic function of the concentrator is to collect data from metering devices, store it and deliver the data to the Message Max platform and on to upper level systems.

DC450 is designed to be modular in both hardware and software structure. This modularity makes introducing new technologies and protocols in the future easy and flexible.

DC450 communicates with the HES system using TCP/IP and GPRS. With the metering devices DC450 uses cost efficient and simple low voltage PLC communication.

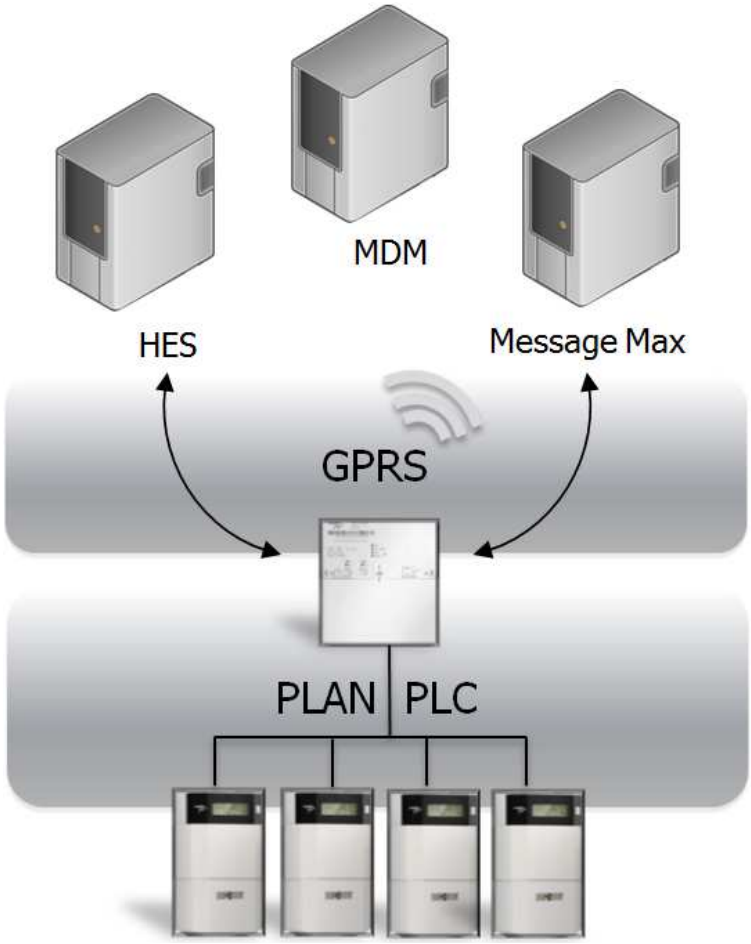

Figure 1. DC450 in the Gridstream system

3 Safety information

The following symbols are used to draw your attention to the relevant danger level, i.e. the severity and probability of any danger, in the individual sections of this document.

Warning
Used to indicate a dangerous situation that could cause bodily injury or death.

Caution
Used to indicate a situation/ action that could result in material damage or loss of data.

Note
Used to indicate general guidelines and other useful information.

In addition to the danger level, safety information also describes the type and source of the danger, its possible consequences and measures for avoiding the danger.

3.1 Responsibilities

The owner of the device – usually the utility – is responsible that all persons engaged on work with devices:

- Have read and understood the relevant sections of the user manual.
- Are sufficiently qualified for the work to be performed.
- Strictly observe the safety regulations and the operating information in the individual chapters.

In particular, the owner of the devices bears responsibility for the protection of persons, prevention of material damage and the training of personnel (Landis+Gyr. provides training courses for this purpose on specific equipment; please contact the relevant agent if interested).

3.2 Safety regulations

The following safety regulations must be observed at all times:

- This equipment does not contain a disconnection device. Means for disconnection from the supply must be provided as part of the building installation. Do not work on the equipment unless the supply is disconnected. If disconnection is done by removal of fuses or other cut-outs, the removed disconnection devices must be kept secure from replacement while work is performed. If disconnection is provided by a switch, the switch shall conform to the requirements of IEC 947-1 and IEC 947-3 or equivalent.
- This equipment does not contain an overcurrent protection device. Overcurrent protection must be provided as part of the building installation. Maximum overcurrent device rating is 125 Amp at 415 Volts, conforming to the requirements of BS1361, or equivalent. The network connections must not be under voltage during installation or when opening. Contact with live parts is dangerous to life. The relevant main fuses should therefore be removed and kept in a safe place until the work is completed, so that other persons cannot replace them unnoticed.
- Only suitably trained and qualified personnel shall be allowed to work on the equipment. Local safety standards shall be observed and shall take precedence over these regulations in points of conflict.
- The devices must be held securely during installation. They can cause injuries if dropped.
- Devices that have fallen must not be installed, even if no damage is apparent, but must be returned for testing to the service and repair department responsible (or the manufacturer). Internal damage can result in functional disorders or short-circuits.
- The devices must on no account be cleaned with running water or with high-pressure devices. Water penetrating can cause short-circuits.
- The device terminal cover should be secured in place before any load is supplied.

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4 Installation requirements

4.1 Installation site conditions

4.1.1 General conditions

The installation site must meet the requirements of the device's protection class (IP51) and the operating temperature range (-25 … +60°C). Other temperatures are possible with external housing and additional warming/cooling. Avoid installing the device on south-facing walls and direct sunlight. If necessary, use an additional shield or visor to protect the outdoor installation case from direct sunlight (shield not provided by Landis+Gyr).

There must be no harmful, corrosive gases or dust on the installation site.

4.1.2 Safety notes concerning the communication module

DC450 can contain a 2G or 3G module. Due to the possibility of radio frequency (RF) interference, it is very important to follow any regulations regarding the use of radio equipment at the place of installation.

There may be a hazard associated with the operation of a 2G or 3G module close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturer of the medical device to determine if it is adequately protected.

Operation of the 2G or 3G module close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturer's recommendations. Make sure that the distance between the GSM/UMTS antenna and any electronic equipment is at least 60 cm.

The following list contains sites referred to in the general safety notes of the 2G or 3G module manufacturer. If you are planning to install the DC450 in the immediate vicinity of any of the following sites, please contact Landis+Gyr.

- Airports
- Service stations
- Hospitals or any other places where medical equipment may be in use.
- Fuel depots, chemical plants, or other locations with a risk of explosion, or sites where blasting work is in progress

Changing the communication module during DC operation:
Before the communication module can be replaced, it must be disabled in the web interface, see Chapter *11.1.2 Changing the communication module*. Removing the module before it is disabled can cause malfunction of the DC and corrupted data.

4.2 SIM card requirements

The SIM card must support GPRS communication. It is recommended to check with the operator that the SIM card's data baud rate and other functions are compatible with the devices the DC450 will be used with.

The SIM card's PIN code enquiry must be switched off. See Chapter *5.2.6 Checking GSM/GPRS/UMTS operation*.

4.3 Antennas

The communication module for DC450 concentrator has a built in GSM antenna. If necessary, an external antenna can be installed to ensure communication. Check the antenna options available from the document *GSM Antenna Overview*.

4.4 Installation location

The DC450 can be installed directly to a wall. Fix the cables to the wall with a fastener under the device's terminal block cover; do not leave the cables hanging free.

The DC450 is intended for indoor use, but outdoor installation is possible with external housing and warming/cooling. Avoid installing the device on south-facing walls and direct sunlight.

4.4.1 Outdoor Installation

When the installation environment exceeds the DC450 protection class, you must use an outdoor installation case. You can order the DC450 concentrators so that they are ready-installed in the cases or so that the concentrators and cases are delivered separately.

The case's connection to electricity network is 3 x 230 V. Neutral of the case must always be connected to the power line network. Pre-fuses (16 A) can be ordered ready-installed in the delivery or installed on site. Check if the connection cable requires smaller fuses.

For more information, see *Outdoor Installation Case Installation Manual*.

4.5 Electricity network connection

The connection to the power line network is 230 V, 3 x 230 V or 3 x 230/400 V. See also Chapter *7.2 Connection diagram*.

You must always connect the neutral and L1 of the concentrator to the power line network. If there is no neutral in the network, you must connect the DC according to Chapter *7.2 Connection diagram*.

5 Installation sequence

5.1 General instructions

Keep low voltage cables, e.g. Ethernet cable, separated from cables with a nominal voltage of 230 Vac. Make sure the cable insulation reaches inside the terminal block cover; do not strip cables more than 40 mm.

Do not leave the cables hanging free. Use a fastener to fix them to the wall and to prevent draw.

5.2 Installation of the DC450 concentrator

5.2.1 Mounting

The DC450 can be installed with its integrated mounting brackets or directly to the DIN rail.

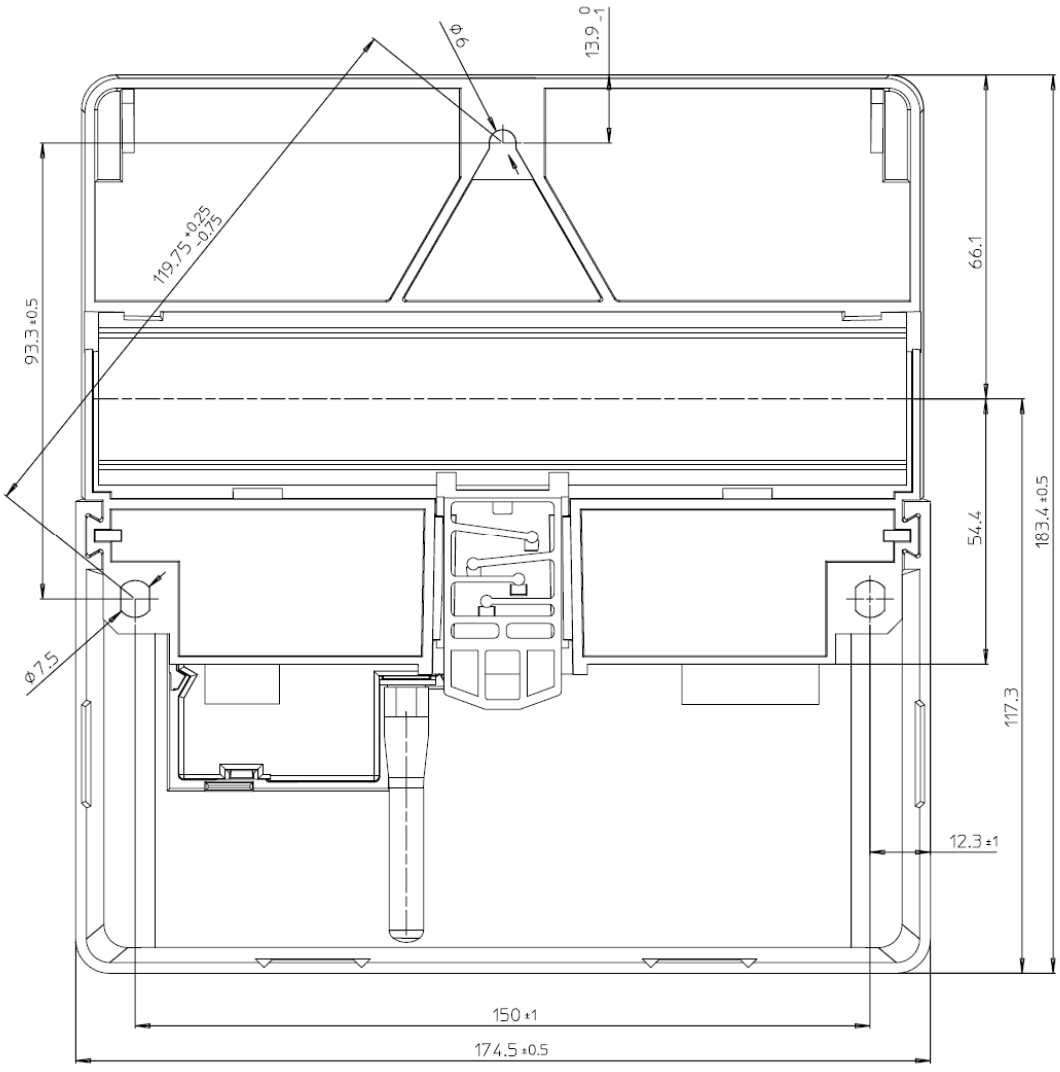

Figure 2. DC450 mounting bracket positions

5.2.2 LED operation

Observe the LEDs in the concentrator front during the installation procedure.

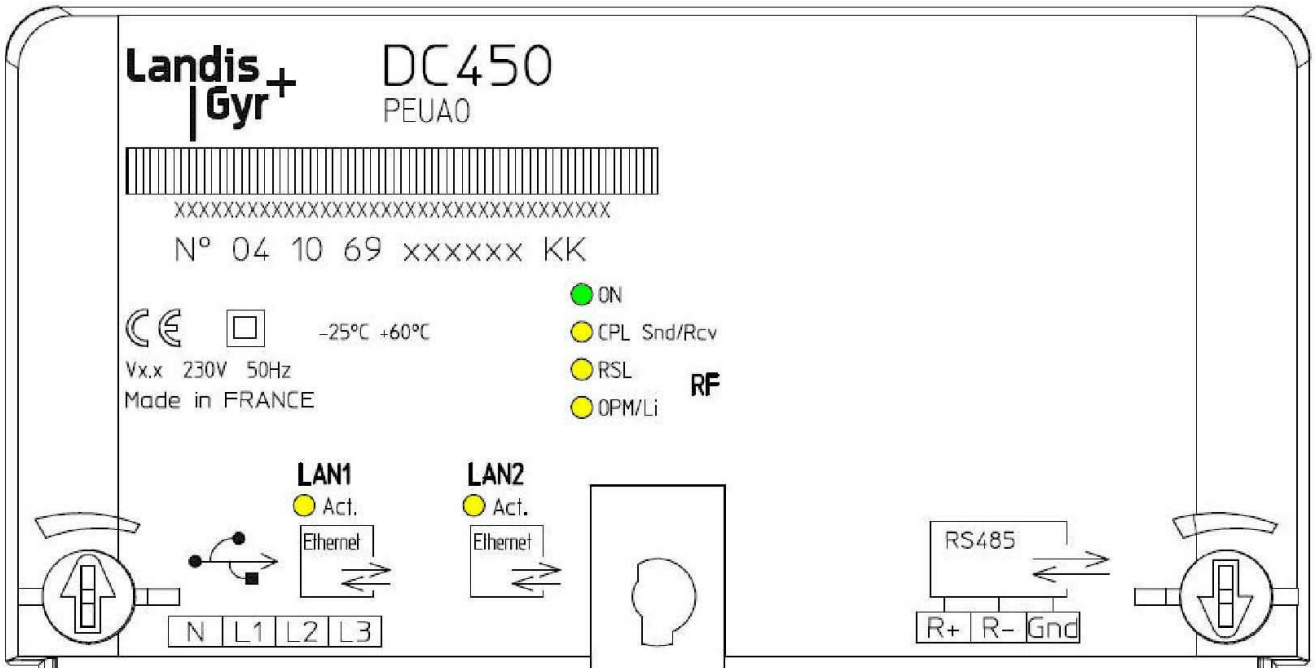

Figure 3. LEDs on concentrator front

Table 1. LED operation in DC450

LED	Interval / State	Colour	Description
ON	250ms ON / 250ms OFF, 2s ON / 2s OFF	Green	Waiting super capacitor to be charged; Normal operation
CPL Snd	ON	Green	Transmitting PLC data
CPL Rcv	ON	Red	Receiving PLC data
RSL	ON/blinking at variable frequency	Yellow	GSM field strength level, see *5.2.5 Checking the signal strength*
OPM/Li	ON	Yellow	GPRS/UMTS connection established
LAN1 Act	ON, Blinking	Yellow	Ethernet cable connected; Receiving or transmitting data
LAN2 Act	ON, Blinking	Yellow	Ethernet cable connected; Receiving or transmitting data

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5.2.3 Installation of the concentrator

Install the concentrator as follows:

1. Check the concentrator for any visible damage caused by shipping. If the device has been damaged, contact your local Landis+Gyr representative.
2. Make sure the voltage is **not** on!
3. Make sure that the concentrator type is correct to the installation site. See Chapter *4.1 Installation site conditions*.
4. Remove the terminal block cover.
5. Place the concentrator on the wall. Fix it to the wall with screws.
6. Make the required wiring according to the connection diagram, which is located on the reverse side of the terminal block cover. See also Chapter *7.2 Connection diagram* and *Figure 8*.
7. Install the communication module.
   - Insert the SIM card into the module, the SIM card is **not** delivered with the DC450 by default.

Figure 4. SIM card slot on the 2G modem

   - If necessary use an external antenna. See Chapter *5.2.4 Installation of the antenna*.
8. Attach the terminal block cover.
9. Switch on the voltage.
10. Wait for approx. 10 min. to charge the super capacitor (check LED).
11. Check the operation after the installation. See Chapter *5.2.6 Checking GSM/GPRS/UMTS operation*.

12. Configure the concentrator's GSM/GPRS/UMTS connection to the metering system. See Chapter *10.3 GSM/GPRS/UMTS configuration*.

Changing the communication module during DC operation:
Before the communication module can be replaced, it must be disabled in the web interface, see Chapter *11.1.2 Changing the communication module*. Removing the module before it is disabled can cause malfunction of the DC and corrupted data.

At the first start-up of the DC450, the backup super capacitor is empty. In order to guarantee a safe shut-down operation, it is necessary to load the super capacitor for approximately 10 minutes. During this time it is not possible to access the DC over the web interface (the "ON" LED will blink 250 ms ON and 250 ms OFF).

5.2.4 Installation of the antenna

The DC comes with a pre-installed ¼ lambda antenna on the 2G modem, located under the terminal block cover. External GSM antennas that can be installed indoors or outdoors are also available. If the antenna is installed outdoors, it should be placed so that snow, ice or other debris cannot collect on the antenna. For detailed installation instructions of the antennas delivered with Landis+Gyr products, see *GSM/UMTS Antenna Data Sheet*.

Installing an external antenna:

1. Connect the antenna cable to the module's GSM antenna connector.
2. Search for the point of sufficient signal strength.
3. Attach the antenna to the surface according to the instructions of the specific antenna type.

Do not place the antenna inside a closed metal box! The external antenna must be at least 60 cm from any electronic device including the DC450 concentrator.

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5.2.5 Checking the signal strength

Place the antenna so that the GSM signal strength is sufficient. Weather may influence the signal strength. If the signal is just above the limit on clear weather, it may be lost altogether when the weather is bad.

To check the signal strength, check the RSL LED on the concentrator front.

LED	Field strength	Explanation
OFF	GSM FSL* is between 0 - 5 or error	Insufficient signal or no signal at all
200ms ON / 1800ms OFF	GSM FSL* is between 6 – 9	Very weak signal, may be lost at times
200ms ON / 800ms OFF	GSM FSL* is between 10 – 14	Weak signal, may be lost at times
ON	GSM FSL* is between 15 – 31	Sufficient signal strength

**FSL = Field strength level.*

5.2.6 Checking GSM/GPRS/UMTS operation

When you have installed the SIM card, antenna and connected power to the DC450, check the OPM/Li LED to check if the concentrator has a connection to the GSM/UMTS network.

If the DC450 is not able to establish a connection to the network, check the following on the web interface (for more information on the web interface, see Chapter *10 Web interface*:

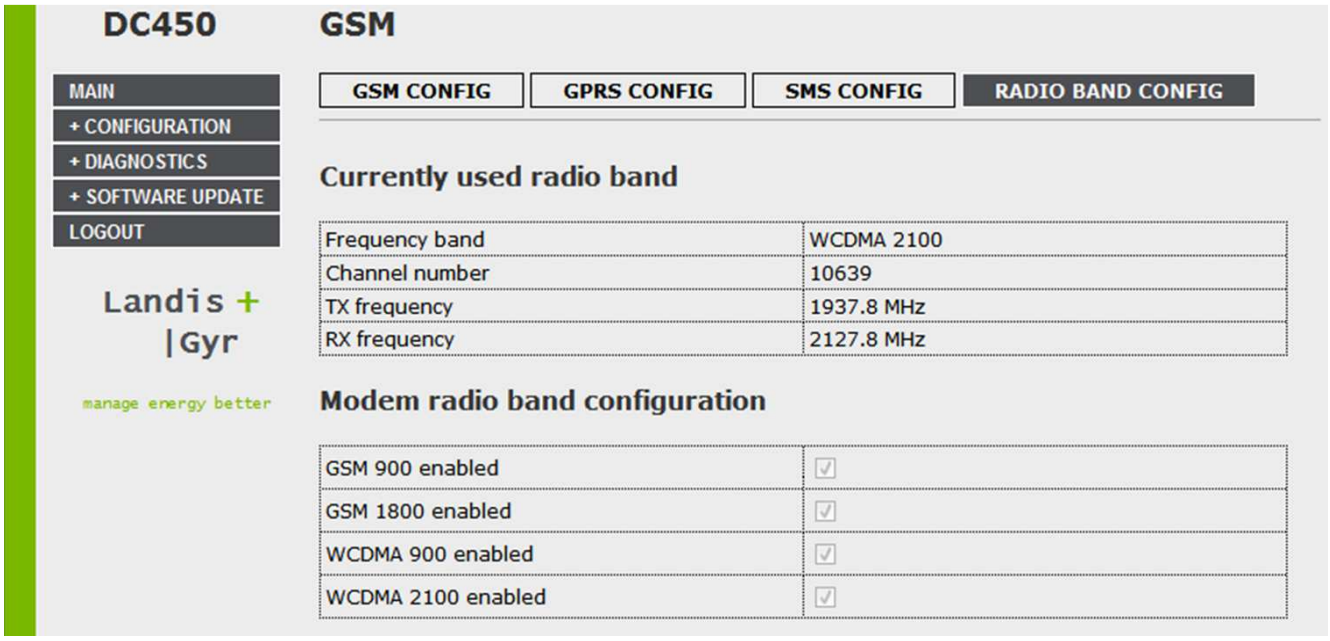

Figure 5. Configuration – GSM – Radio band config page

1. Make sure the requested radio band is activated.
2. Move the DC450's antenna to find a location where the signal strength is sufficient. Additionally, a mobile phone can be used to check that the installation location in general is within GSM/GPRS/UMTS signal range, but note that some phones are 3G enabled. The availability of a 3G network does not guarantee a GPRS/2G network and vice versa.
3. Check that the SIM card is properly installed.
4. Switch off the PIN code request of the SIM card. Remove the SIM card from the concentrator and install it to a GSM mobile phone to switch off the request (see the phone's instructions) and reinstall it to the concentrator.

If the GSM/GPRS/UMTS module is still not operational, it could be that the APN information has not been pre-defined at production. Contact your local Landis+Gyr representative for more information.

5.2.7 Meter response timeout (with RS-485 only)

When connecting any device to DC450 through the RS-485 connection, this device needs to be configured so that the response timeout is greater or equal to 200 ms.

For instance, in the case of S650 Smart Grid Terminal, you have to make sure that the value of attribute "ResponseTime" of object HDLCsetupDataCh1 (0-1:22.0.0.255), class [23-0-1-0] in the device configuration is set to 200.

5.3 Installation of DC450 to the Gridstream system

The field installation does not include any system installation steps. Information of DC450 concentrators is entered in a CSV file to the Gridstream system through the AIM/HES Application Manager. For more information, see *AMR User's Manual*.

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6 Faceplate and LEDs

The nameplate of DC450 concentrator has information on the manufacturer, CE marking, required voltage and frequency, transceiver type and type of the device. Below is an example of the information marked on the nameplate.

The device has six LED indicators visible on the front. See *5.2.2 LED operation* for description of functions.

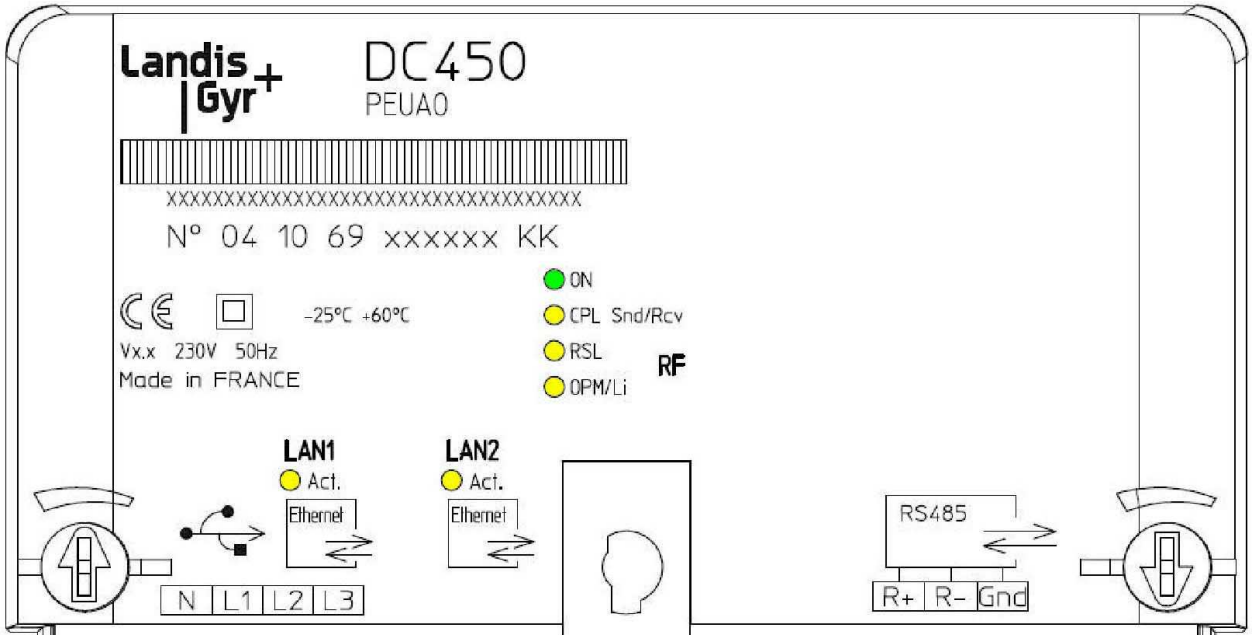

Figure 6. Faceplate and markings

7 Dimensions and connection diagram

7.1 Dimensions

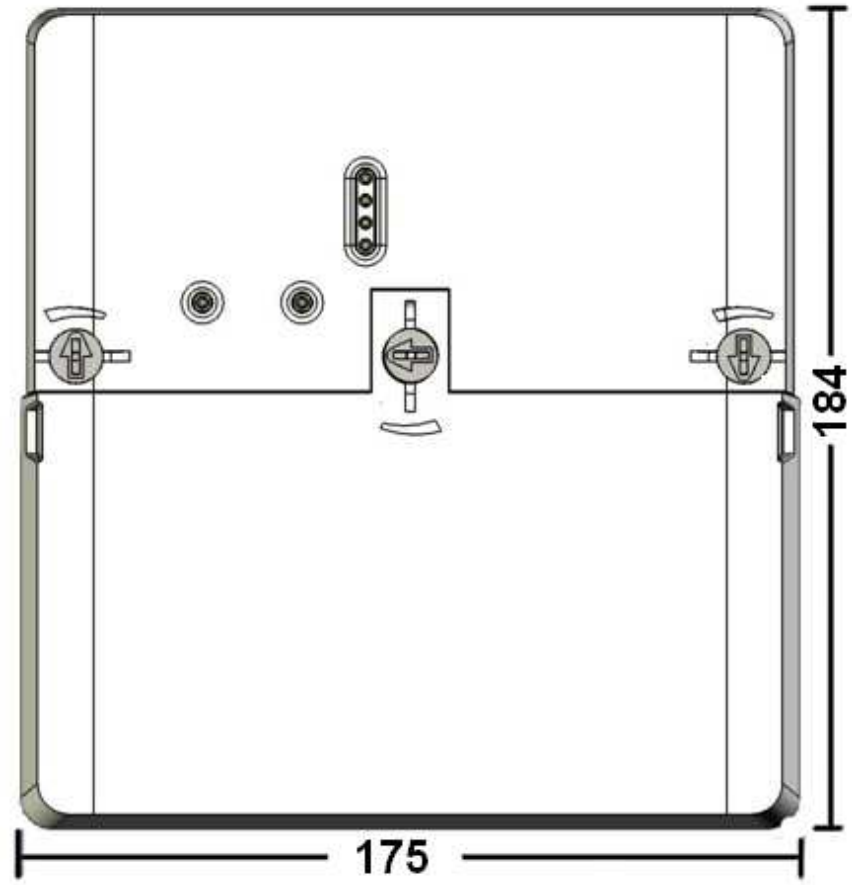

Figure 7. Dimensions of the DC450 Concentrator

L =175 mm;

l = 184 mm;

h = 72 mm (without sealing)

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7.2 Connection diagram

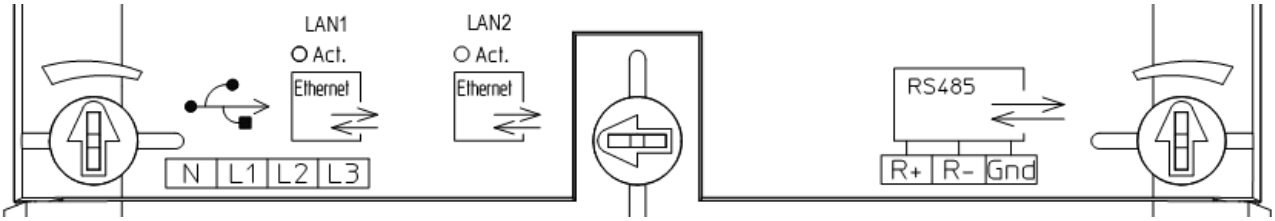
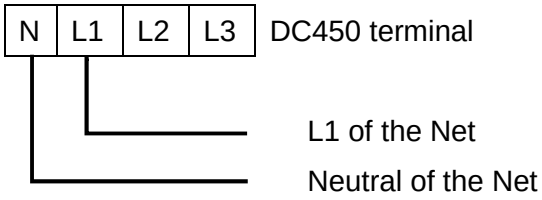
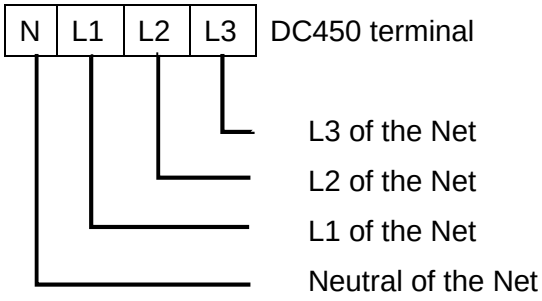


Figure 8. Connection diagram of the DC450 printed on the faceplate

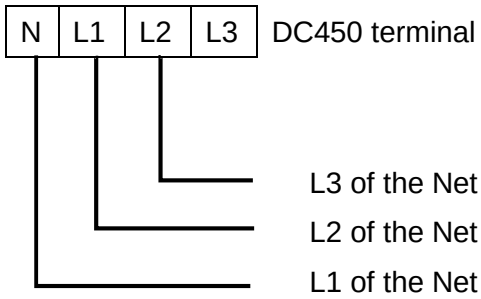
Single phase 230 V



3-phase 230/400 V



3-phase 230 V, no neutral



8 Alarms

The concentrator keeps a log of internal alarms. Longer error conditions are reported as alarms, which are set on and off as the conditions appear and disappear. The alarms can be read from the web interface. The DC can store up to 128 simultaneous alarms in the alarm log.

Alarm	Description
ALARM_RTC_FAULT	The RTC chip has malfunctioned.
ALARM_OVER_TEMPERATURE	The internal temperature of the DC is above the high alarm limit.
ALARM_UNDER_TEMPERATURE	The internal temperature of the DC is below the low alarm limit.
ALARM_POWER_CUT	The DC has lost power.
ALARM_MODEM_UNREACHABLE	The DC cannot establish a connection to the internal GSM/GPRS modem.
ALARM_NO_SIM	No SIM card has been installed.
ALARM_PIN_CODE	The SIM card is asking for a PIN code. The DC does not support PIN codes. The PIN code prompt must be switched off on the SIM card before installation.
ALARM_ETHERNET_CABLE	The Ethernet cable is not connected.
ALARM_LOW_DISK_SPACE	Free space on the flash memory drive is below the alarm limit.
ALARM_LOW_INODES	The number of free i-nodes on the flash memory drive is below the alarm limit.
ALARM_GSM_CONNECTION_DOWN	The GSM/GPRS connection is down.
ALARM_ETHERNET_DOWN	The Ethernet connection is down.
ALARM_PLAN_MAC_NOT_DEFINED	No PLAN MAC address has been defined and therefore PLC communications are down.
ALARM_PLAN_NO_SYNCRO	The DC is unable to synchronise with the PLAN network.

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Alarm	Description
ALARM_UNIT_SIMULATOR_ACTIVE	The DC is using the PLC meter simulation feature. This feature is used for the internal testing of the DC and should not be enabled in a production environment.
ALARM_LOW_FREE_MEMORY	The DC is running low on memory.
ALARM_LOAD_AVERAGE_EXCEED	Some process on the DC is taking up more processor time than allowed. Under some circumstances, load average can be exceeded temporarily.
ALARM_WEAK_GSM_SIGNAL	The GSM field strength is too low.
ALARM_PLAN_OUT_OF_ORDER	The PLAN chip is malfunctioning.
ALARM_LID_OPEN	The lid (terminal block cover) of the DC is open.
ALARM_LOCAL_ETHERNET_UP	The local Ethernet interface is in use.
ALARM_RTC_INCORRECT_TIME	Real time clock time has been found to be incorrect.
ALARM_DB_FAILURE	At least one application on the DC is unable to open its internal SQL database.
ALARM_INVALID_CONFIGURATION	At least one configuration variable on the DC has an invalid value.
ALARM_ODEP_LOGIN_BLOCKED	ODEP login has been temporarily blocked due to multiple failed login attempts.
ALARM_NTP_FETCH_FAULT	The DC is unable to synchronise its RTC time with the configured NTP server.
ALARM_TEMP_PLC_COM_ERR	Indicates that a large number of PLC devices have simultaneously stopped responding.
ALARM_HIGH_UNIT_COUNT	The absolute maximum of 2500 PLC devices has been registered and stored in the DC database. No new devices can be installed by the DC before this alarm has been reset by removing some devices.

9 Events

The concentrator keeps a log of internal events. The event log can be read from the web interface. The size of the event log is 1000 latest events.

Event	Description
NOTICE_MASTER_TIME	A change in RTC master time has been forced on the DC.
NOTICE_TIME_CHANGED	The RTC time on the DC has been changed.
NOTICE_TIME_NOT_CHANGED	The RTC time on the DC has not been changed, because the time shift exceeded the limit.
NOTICE_STARTUP	The operating system of the DC has started up.
NOTICE_CONFIG_CHANGED	Configuration of the DC has been changed.
NOTICE_SW_UPDATE	The firmware of the DC has been updated.
NOTICE_ODEP_CONNECTION_TIMEOUT	An ODEP connection has timed out.
NOTICE_ODEP_CONNECTION_ERROR	There has been an error in establishing an ODEP connection.
NOTICE_PUSH_CONNECT_ERROR	There has been an error in establishing a push connection with MessageMax.
NOTICE_PUSH_SENDING_ERROR	There has been an error during the sending of push data.
NOTICE_PUSH_COLLECT_ERROR	There has been an error in gathering the data that should be pushed.
NOTICE_INVALID_ODEP_FRAME	An invalid ODEP frame has been received.
NOTICE_SMS_RECEIVED	An SMS message has been received by the DC.
NOTICE_CALL_RECEIVED	A wake-up call has been received by the DC.
NOTICE_MODEM_CONNECTION_RESET	The GSM/GPRS connection was reset.

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Event	Description
NOTICE_UNIT_REMOVED	A meter has been explicitly removed from the DC.
NOTICE_ALL_DATA_REMOVED	All collected data has been deleted from the DC.
NOTICE_PLAN_NOT_RESPONDING	The PLAN chip is not responding.
NOTICE_RELEASE_ALL_UNITS	The DC has been requested to release all meters.
NOTICE_PROCESS_WD_FAIL	A process has failed to reply to a request from the software watchdog.
NOTICE_TEMP_READ_FAILURE	Reading the internal temperature of the DC has failed.
NOTICE_USER_LOGIN	A user has logged in a terminal connection on the DC.
NOTICE_SMS_SEND	An SMS message has been sent by the DC.
NOTICE_OUT_OF_MEMORY	DC has run out of free RAM. If this event occurs, DC will do a recovery reboot.
NOTICE_RECOVERY_DONE	Software recovery has occurred.
NOTICE_TOO_MANY_FDS	Too many open file descriptors have been detected. If this event occurs, DC will do a recovery reboot.
NOTICE_TOO_MANY_PIDS	Too many running processes have been detected. If this event occurs, DC will do a recovery reboot.
NOTICE_SW_UPDATE_DOWNLOAD_FAIL	Update package download from FTP/HTTP server failed.
NOTICE_USB_DEV_ADDED	A USB device has been plugged in.
NOTICE_USB_DEV_REMOVED	A USB device has been removed.

10 Web interface

DC450 has an internal web user interface that can be accessed in two ways:

- Through the local Ethernet connection (mainly for initial system interface configuration to establish communication with the metering system). For more information, see *10.1 Connecting to the concentrator locally through LAN*.
- Through an uplink connection (GPRS/UMTS or Ethernet) after it is configured and operational.

To ensure that the system and concentrator have the same configuration data, it is recommended to do other concentrator configurations through the metering system.

Compatible web browsers:
Mozilla Firefox (latest version), JavaScript must be enabled
MS Internet Explorer (latest version), JavaScript must be enabled
Other browsers may work but have not been tested.

The web interface can be used to configure a single concentrator. For configuring or updating a larger amount of concentrators at once, Device Management must be used, see *Device Management User Manual*.

Service personnel can also use the web interface for diagnostics and troubleshooting. Alarms, events, statistics and log data collected by the DC as well as data read from the meters can be previewed in the web interface.

The following web interface pages are available to “admin” users:

Main
Configuration
Ethernet
Basic configuration
GSM
GSM configuration
GPRS configuration
SMS configuration
Radio band configuration
PLC
Control
Basic configuration

Discovery configuration
Repeater call configuration
Communication failure monitoring
Meter installation / Alarm seek mode
Push
Triggers
View push profiles
View push profiles of a meter
View push profiles of devices
View profile selectors
RTC
Set time
Basic configuration
NTP configuration
Serial server
Basic configuration
Readings
Configuration
Reading profiles
Bindings
View profiles of devices
View profile selectors
Reading delay configuration
Security
Authentication
Firewall
Diagnostics
DC Logs
DC Profiles
Uplink
Modem statistics
Ethernet statistics
Serial server statistics
ODEP statistics
Push statistics
Connection test

TLS Proxy
PLC
Statistics
Units summary
Units PLAN summary
Registration history
Unit data
Reading profile
Time status
Series
Event logs
Register
Reading statistics
Software update
Version history
Update history
Update log
SW Update
SW Update job
FW Update jobs
Maintenance
Data management
Application control
Push activation
PLC utils
Debug package

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10.1 Connecting to the concentrator locally through LAN

To connect to the concentrator for initial configuration you need:

- A laptop computer with an Ethernet connection (100 Mb/s or 1000 Mb/s)
- Ethernet crossover cable.

Creating the connection:

1. Connect the Ethernet cable to your laptop's Ethernet port.
2. Connect the Ethernet cable to the concentrator's LAN2 Ethernet port.
3. The concentrator's default IP address is `10.0.0.2`. Configure your laptop IP address to be in the same network, e.g. `10.0.0.1` with subnet mask `255.255.255.0`. Check your operating system manual for instructions on how to define IP addresses.
4. When the LAN2 LED on the concentrator faceplate is lit or flashing, connection has been established between the concentrator and your laptop.
5. Open the web browser and enter the concentrator IP address to the address row.
6. The browser opens an authentication window. Enter the username and password provided by your system admin or Landis+Gyr representative.
7. The main page of the concentrator's web interface is opened in your browser.

The concentrator web interface can also be accessed over GPRS. You need a laptop computer with a connection to the same GPRS network the concentrators are in. Otherwise proceed as with LAN connection.

10.2 Web UI Main page

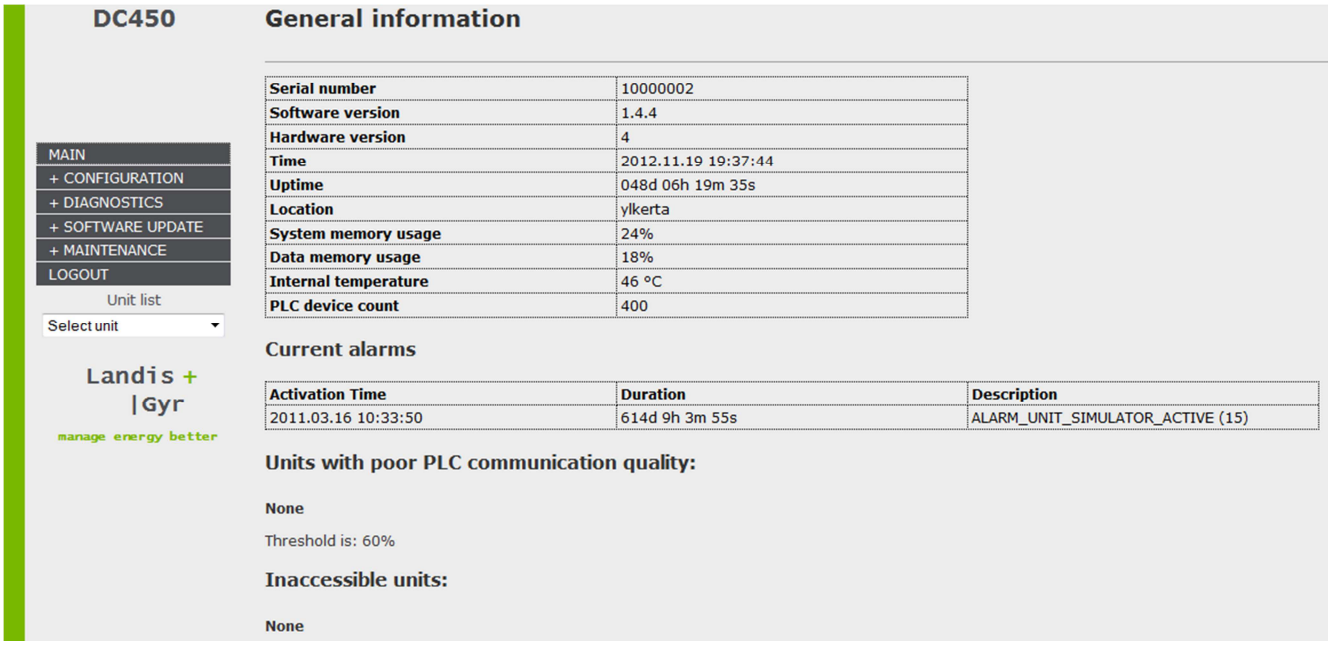

Figure 9. Concentrator's web interface main page

PLC device count:
Each concentrator can handle up to 2500 metering devices. This is a fixed limit meaning that the DC will not install any more PLC devices once it has 2500 devices in its database.
Poor PLC network quality, long distances and the amount of data collected per meter can substantially decrease the practical number of nodes before the theoretical maximum limit is reached.

10.3 Configuration

10.3.1 GSM/GPRS/UMTS configuration

If not configured in production, the initial GSM/GPRS configuration must be done locally to establish communication with the metering system. After communication is operational, other configurations can be done from the system. SMS configuration is not necessary at this point; it can also be configured later.

Changing the communication module during DC operation:
Before the communication module can be replaced, it must be disabled in the web interface, see Chapter *11.1.2 Changing the communication module*. Removing the module before it is disabled can cause malfunction of the DC and corrupted data.

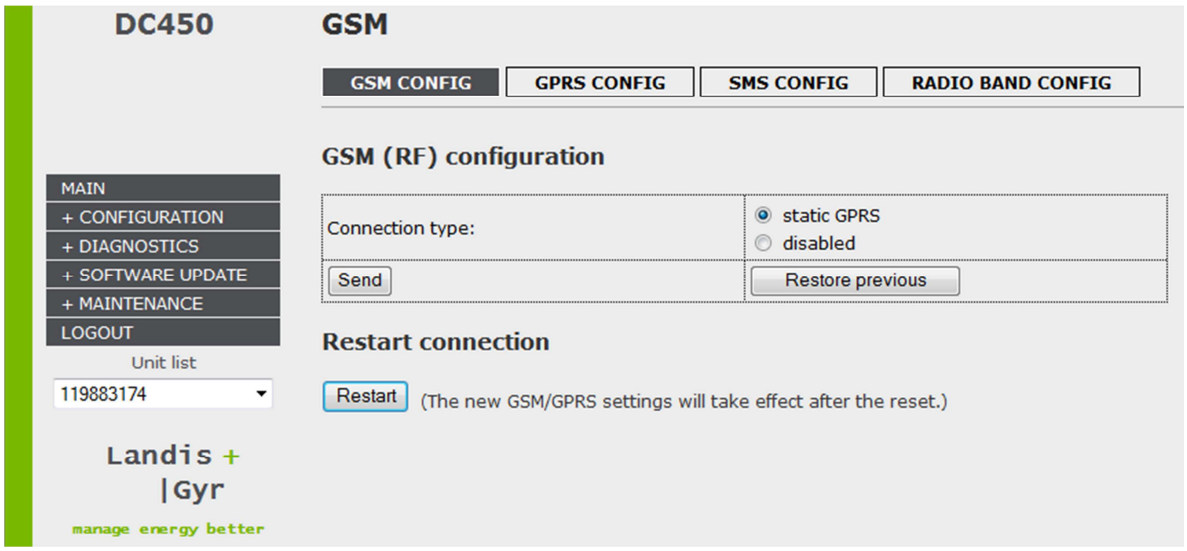

Figure 10. Configuration – GSM – GSM config page

1. First select **CONFIGURATION** and then **GSM** in the Main Menu on the left. The **GSM CONFIG** page is displayed.
2. Set connection type as **Static GPRS** (always on).
3. Click **Send** to send the parameters to the concentrator.
4. Select **GPRS CONFIG** from the top of the page.

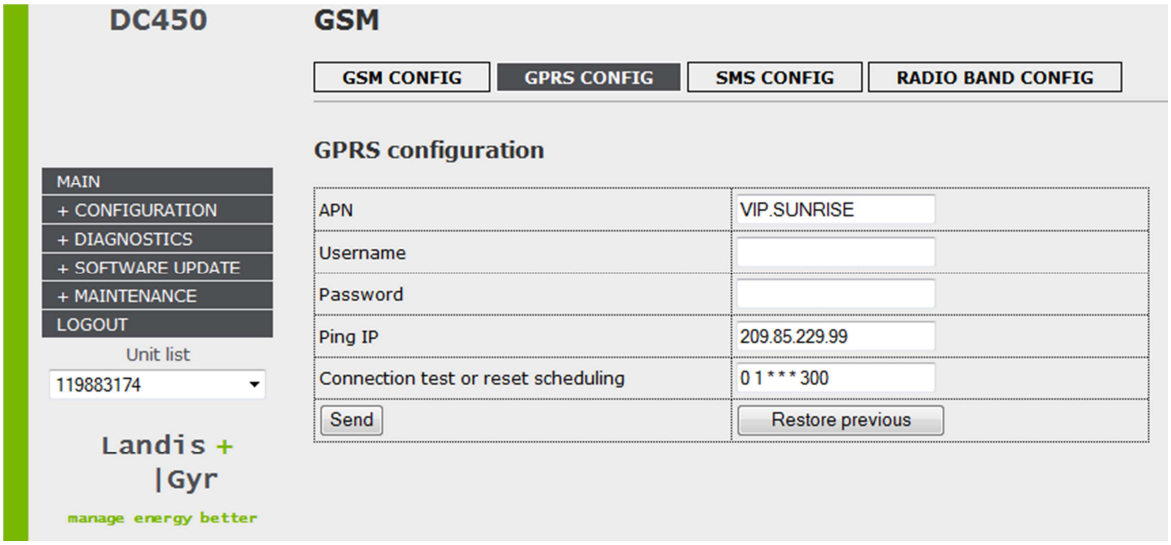

Figure 11. Configuration – GSM – GPRS config page

5. On the **GPRS CONFIG** page, you can enter the **APN address** of the local GSM operator to the dialog.
6. If the GSM operator requires the username and password information for GPRS communication, also enter the **Username** and **Password**. You can also enter a **PING IP** address and parameters for the **Connection test or reset scheduling**.
7. Click **Send** to send the parameters to the concentrator.
8. After you have entered all the configuration data, return to the GSM **CONFIG** page and click **Restart**. The new settings will take effect after restarting.

10.3.2 PLC configuration

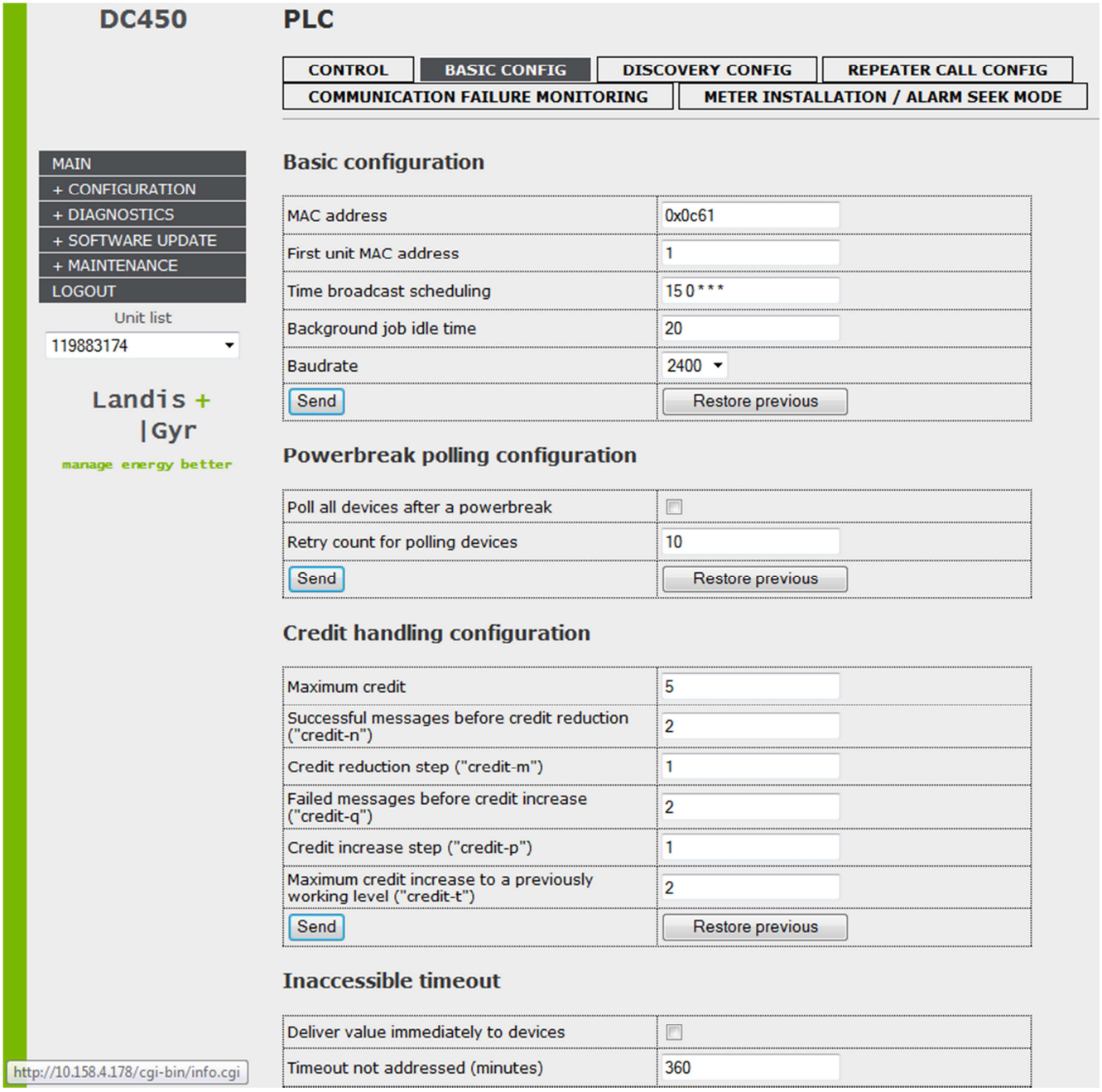

Figure 12. Configuration – PLC – Basic config page for PLAN(+) configuration

To start PLC communication, the MAC address of the DC must be set. The first PLC MAC address in a PLC network is C00 [HEX] (input value for C00 [HEX] = 0x0C00). For the data concentrator, the MAC address range is from 0xC00 to 0xDFF. For the meter, the MAC address range is from 0x001 to 0xBFF. If necessary, the MAC address range of the meters can be restricted from the DC using the “First unit MAC address” parameter.

The baud rate for PLC communication must be configured according to the used meter type (PLAN 1200 bps or PLAN+ 2400 bps). This can be done either from the metering system or on the DC web interface PLC configuration page.

To make sure that remote meters can be reached, set maximum credit to 7.

It is always recommended to do the configuration from the system. This ensures that the concentrator and system have the same configuration data.

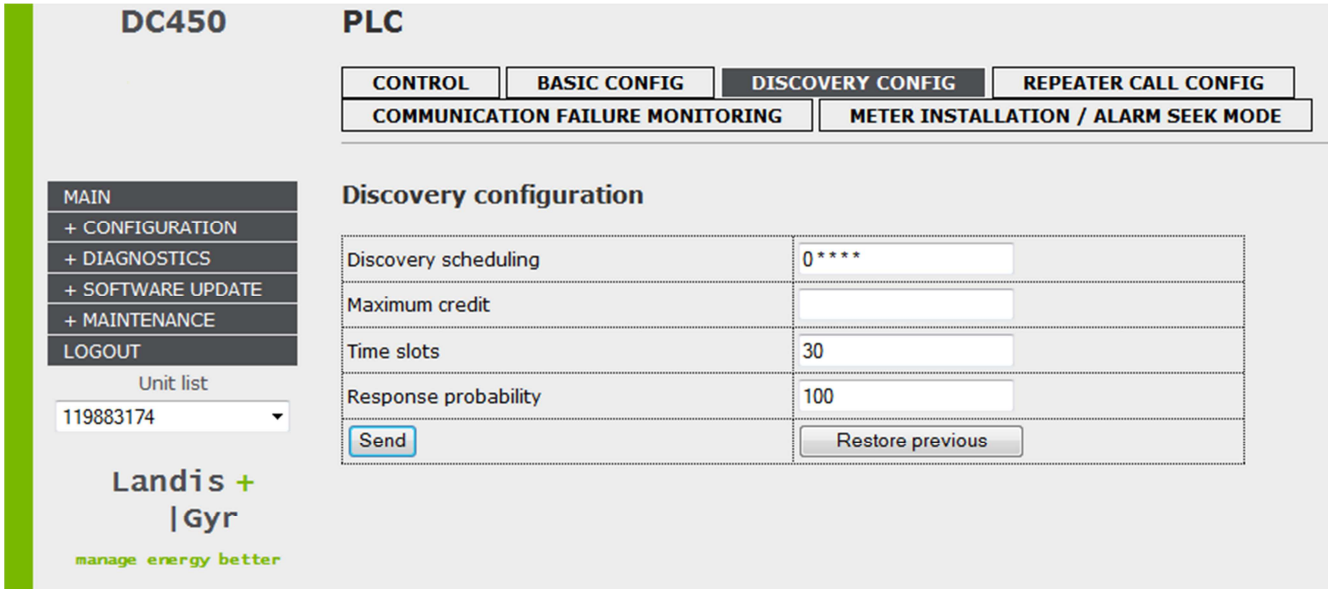

Figure 13. Configuration – PLC – Discovery config page

10.3.3 Repeater call

Repeater call was introduced in SW version 1.2.0. It is a procedure that can automatically manage the repeater state of the modules in a PLC network. Repeater call optimises communication by reducing the number of repeaters to a minimum. The interval for the automatic repeater call procedure is configurable. Automated repeater call functionality is disabled by default.

Be careful when enabling repeater call in a network. Whenever you enable a repeater call, you should monitor network behaviour for a few days. In case network behaviour deteriorates, you need to roll back and set all meters back to repeater mode, which is a manual procedure. For more details, contact your field engineer or PM.

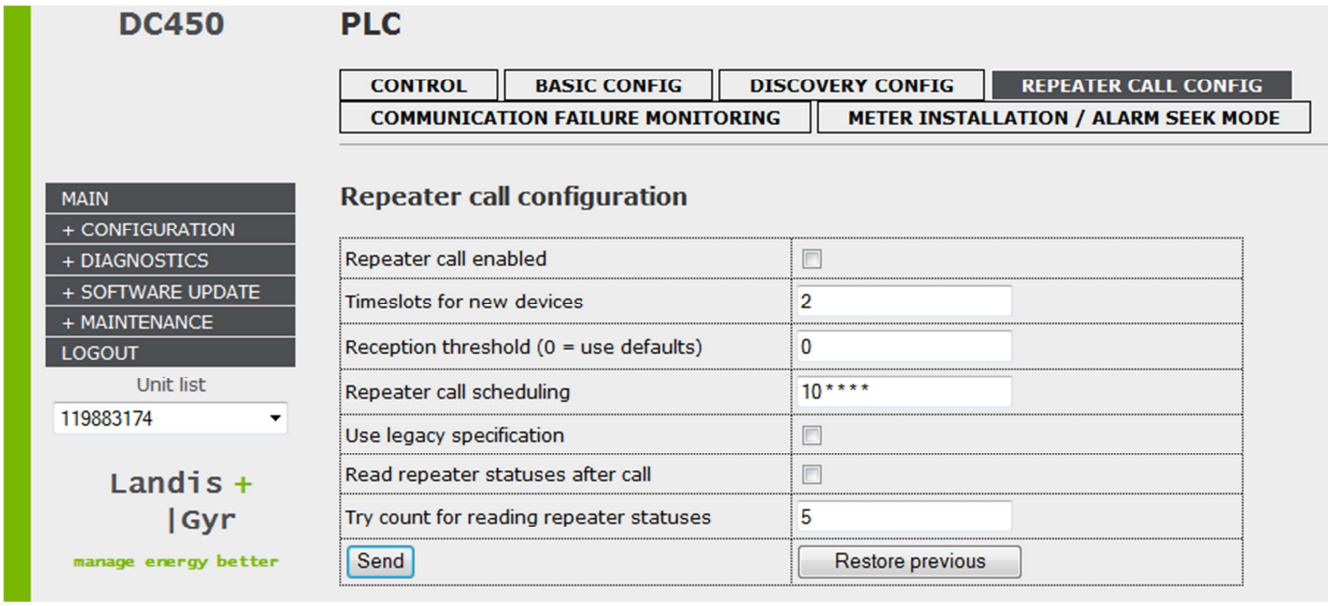

Figure 14. Configuration – PLC – Repeater call config page

The concentrator supports two different kinds of scales for the repeater call threshold level. This threshold level mode can be configured on the concentrator. Legacy mode is intended for E35C modules, where the threshold level is a scaled value between 0 and 65535. In normal mode, the threshold level is between 0 and 255 (dBuV). If the threshold level is set to 0, DC will not include threshold level in the repeater call command. Therefore, all devices are using the default value (104 dBuV). This makes it possible to use the repeater call functionality in mixed networks where both E35C modules and E450 meters are installed.

If the PLAN(+) bandwidth is heavily used, do not select “Read repeater statuses after the call”. This consumes additional bandwidth.

Repeater states are automatically read when a new device is installed. If configured to do so, the DC also reads the statuses after a scheduled or manually triggered repeater call.

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10.3.4 Communication failure monitoring

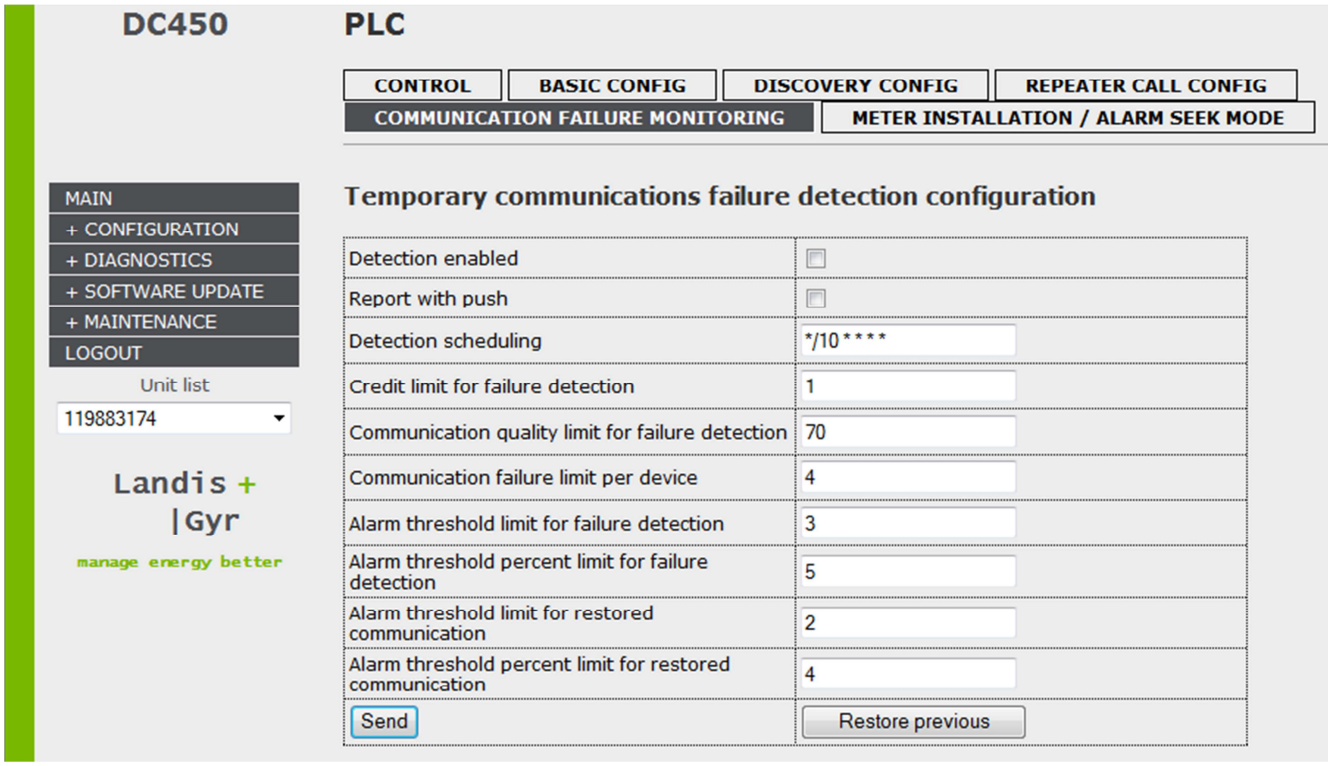

Figure 15. Configuration – PLC – Communication failure monitoring page

Based on PLC statics, the DC can be configured to detect any sudden loss of communications to meters that have previously had good quality communications. If a loss of communication with a significant number of meters is detected, the DC sends a notification to the system allowing system operators to investigate the root cause. Problems in the distribution network, such as feeder or phase outages, can be detected this way.

The DC counts consecutive communication failures for each device. The counter is incremented after each failed communication attempt and reset after every successful communication with the meter.

These counters are analysed periodically. When at least the configured number of devices with good communication quality (defined by CL and CQL) have had the configured number of communication failures (the maximum of TU and TP), the DC will set an alarm and request a notification push to the system. The alarm is reset when communication has been restored to the configured amount of devices (minimum of TUC and TPC).

These are the rules for detecting a sudden loss of communication:

- CL: Credit limit for failure detection (default 1)
- CQL: Communication quality limit for failure detection (default 70%)
- FL: Communication failure limit per device (default 4)
- TU: Alarm threshold limit for failure detection (default 3)
- TP: Alarm threshold percentage limit for failure detection (default 5%)

- TUC: Alarm threshold limit for restored communication (default 2)
- TPC: Alarm threshold percentage limit for restored communication (default 4%)

CL and CQL are used to define the sample meter population to be monitored. FL defines the number of consecutive failures required for a meter to be registered as temporarily unreachable.

TU, TP, TUC and TPC are thresholds that define the trigger point for notification. The percentage means the percentage of meters with good communication as defined by CL and CQL.

There is no field experience with this functionality yet. The default parameters are theoretical assumptions. Be aware that fine tuning will always be necessary. There is no default parameter set that will fit all network sizes and qualities.

10.3.5 Readings configuration

If PLAN capacity is an issue, Readings configuration needs to be changed. In most cases, however, no change is necessary.

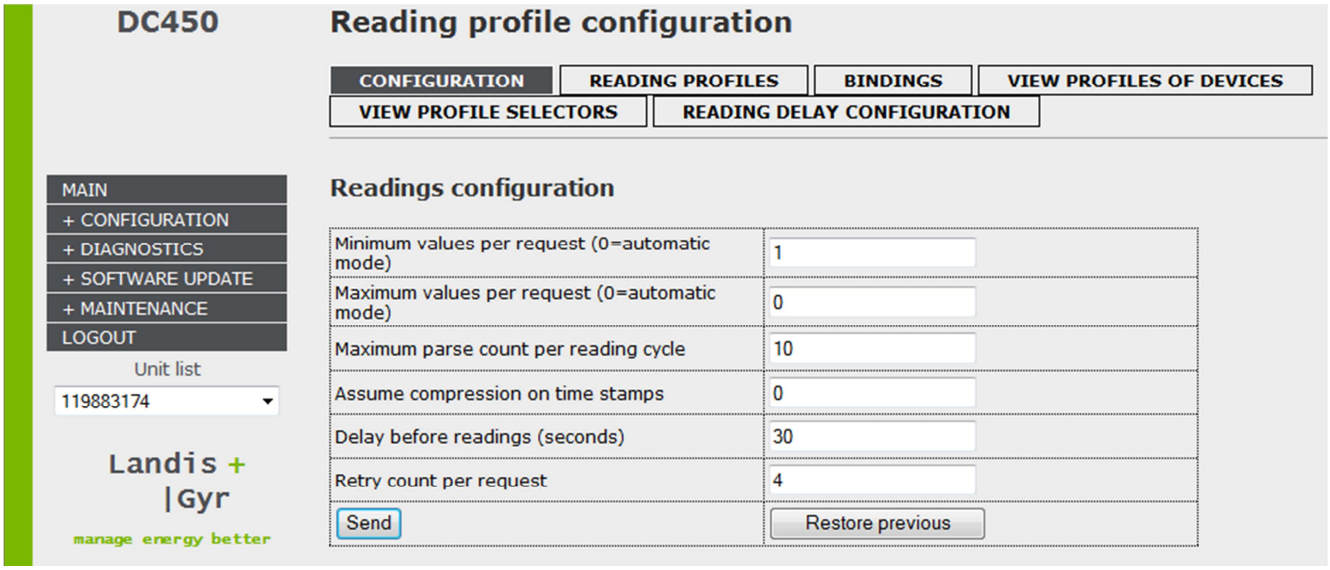

Figure 16. Configuration – Readings – Configuration page

Field name	Value	Description
Minimum values per request (0=automatic mode)	1	The number of values the DC bundles in one request under normal operation. If this value is higher than the number of “Maximum values per request” (see below), the number of maximum values is used by the DC.
Maximum values per request (0=automatic mode)	0	The maximum number of values the DC bundles in case of a backlog (the value should be 0 or higher, or equal to “Minimum values per request”.
Maximum parse count per reading cycle	10	The maximum number of requests the DC does on a single unit before moving on to the next unit.
Assume compression on time stamps	1	If compact read is active on all meters for all load profiles, this value should only be set to 1. It affects the automatic calculation of minimum or maximum values per request.
Delay before readings (seconds)	30	The delay in seconds that the DC waits before sending requests to profiles in order to avoid requesting data that is not yet present in the meter.
Retry count per request	4	The number of retries the DC does in case of a non-successful request.

To optimise load profile reading, “Minimum values per request” should be set to “0” (automatic). For more details, see the Capacity Calculator or application notes.

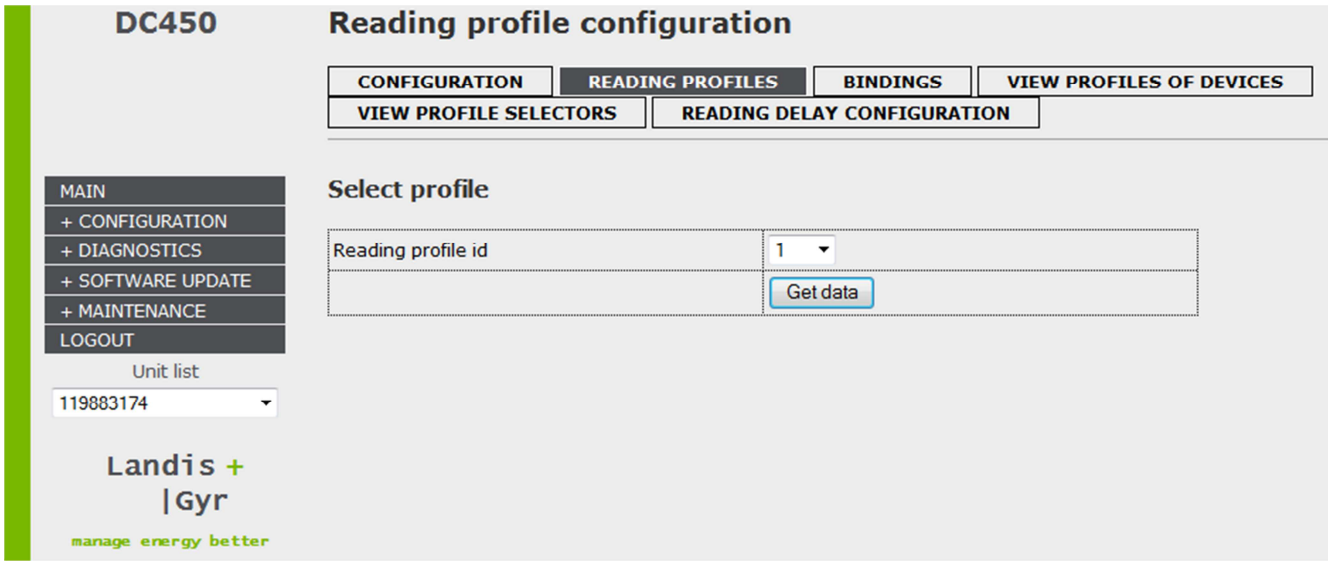

Figure 17. Configuration – Readings – Reading profiles page

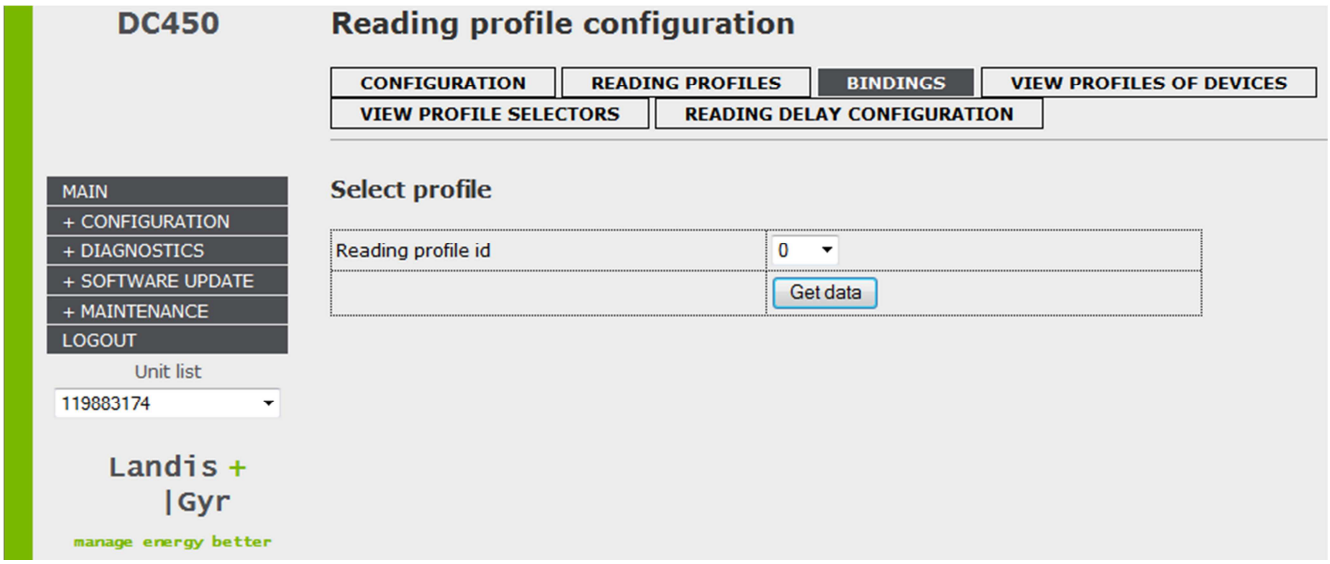

Figure 18. Configuration – Readings – Bindings page

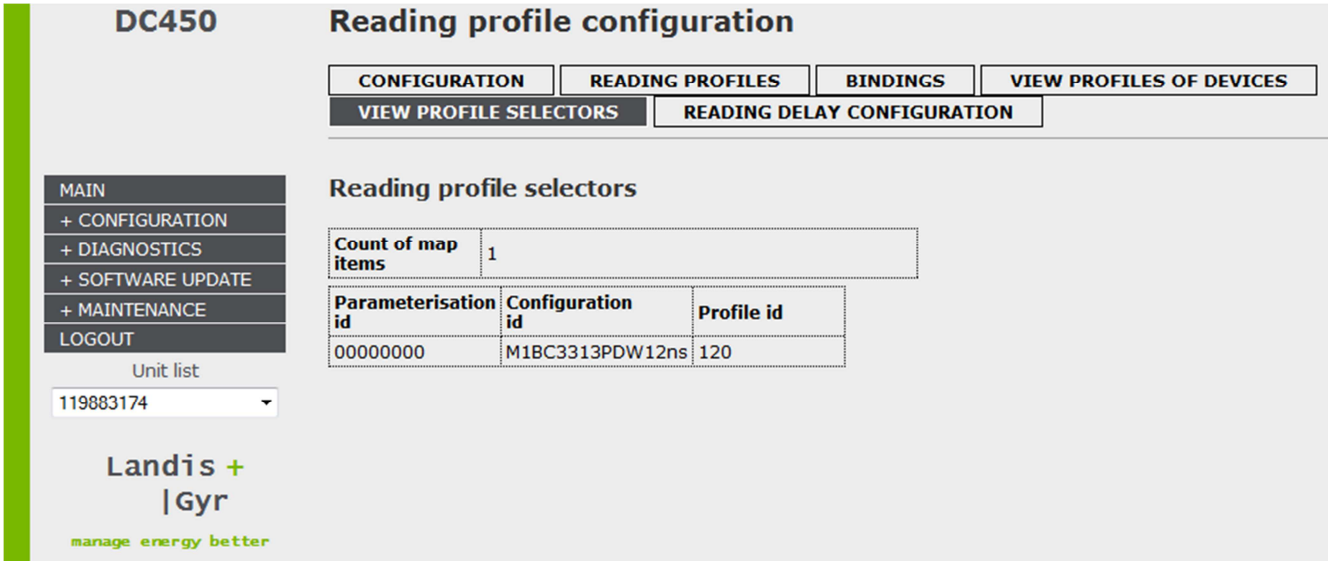

Figure 19. Configuration – Readings – View profile selectors page

10.3.6 Other configuration options

It is always recommended to do the configurations from the system. This ensures that the concentrator and system have the same configuration data.

However, the concentrator web interface has other configuration options available. It is not recommended to do configuration tasks directly on the concentrator; these should rather be used for verification and diagnostics.

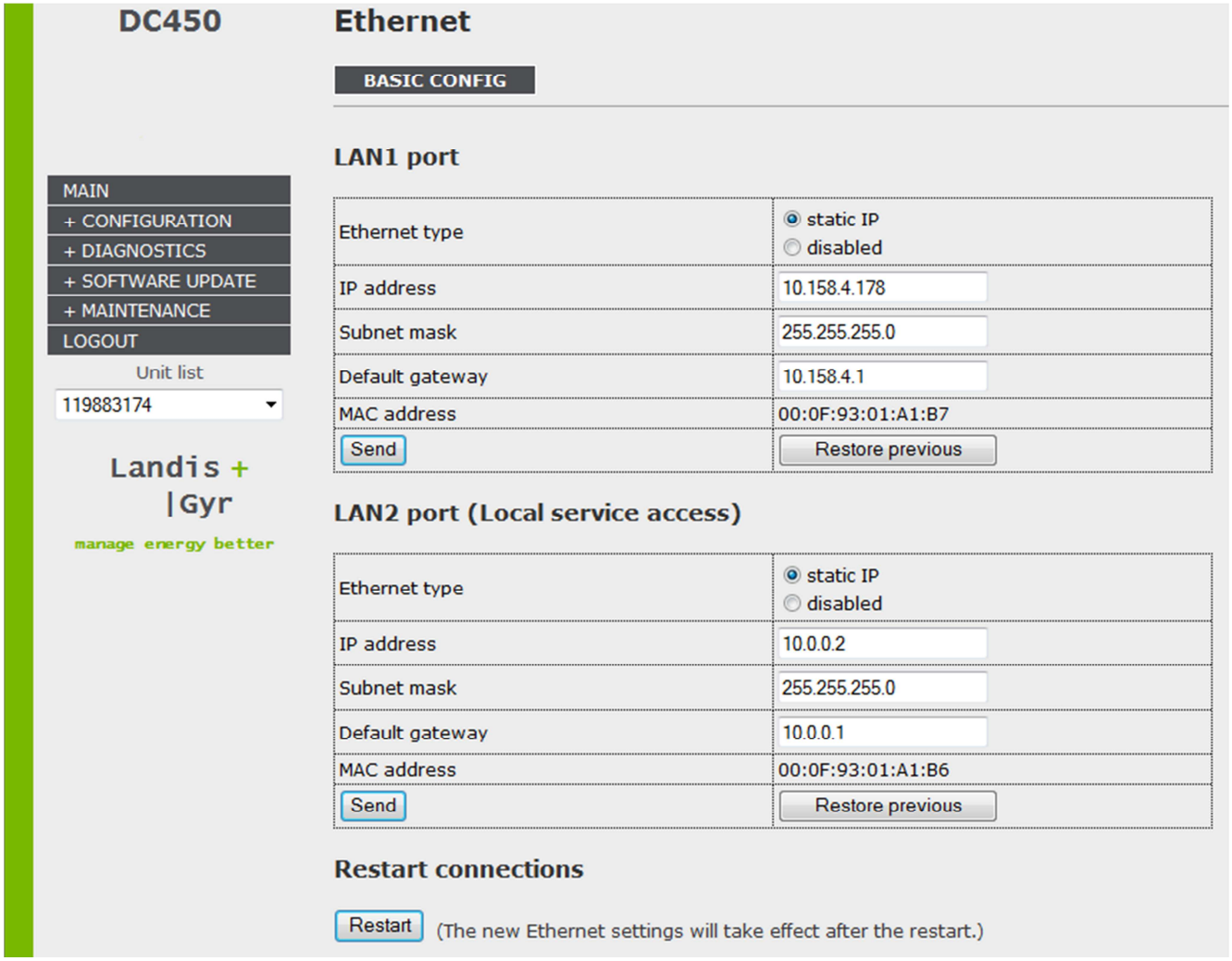

Figure 20. Configuration – Ethernet – Basic config page

The LAN1 connection is intended for communication with the metering system.

The LAN2 connection is for local service access for diagnostics and configuration.

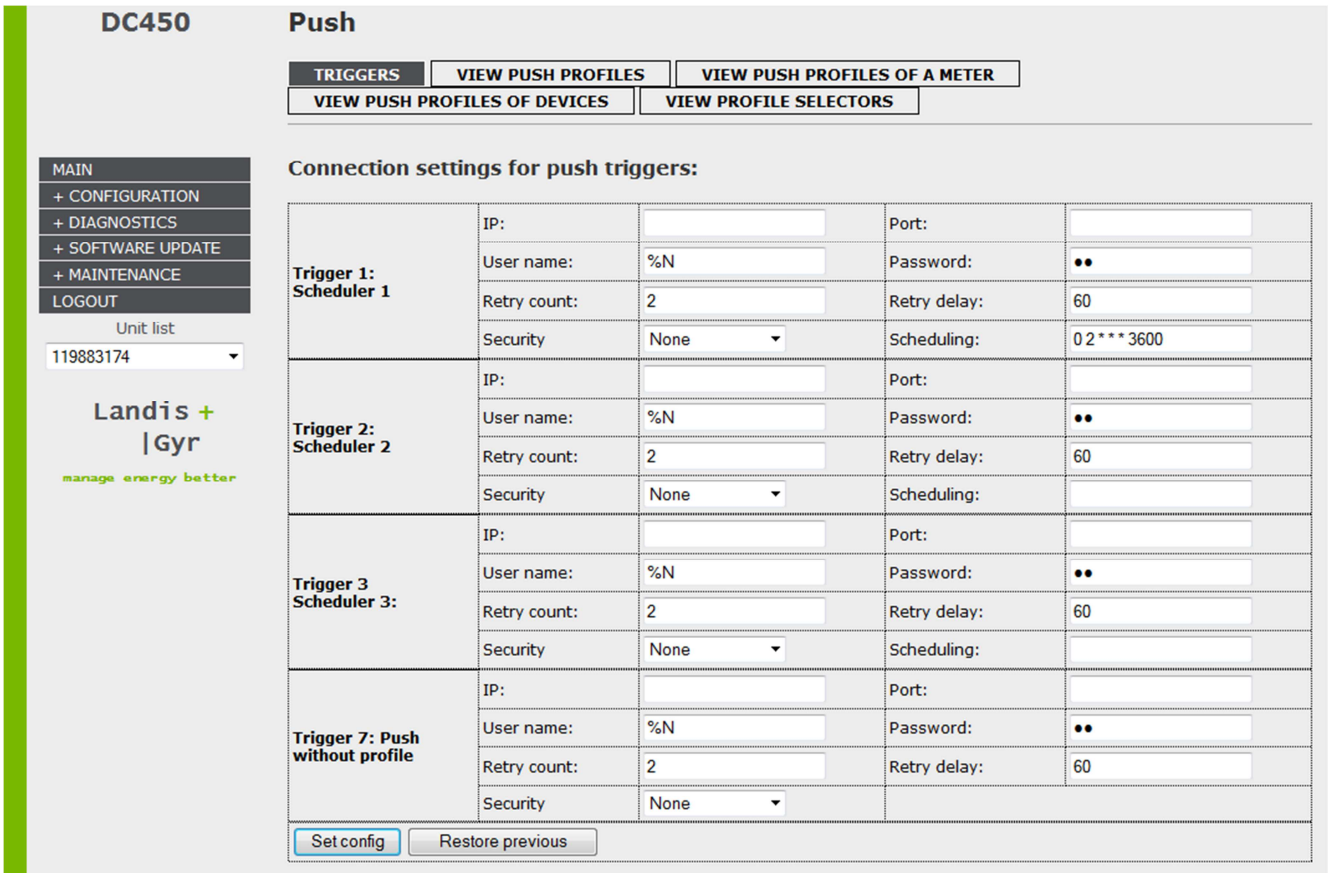

Figure 21. Configuration – Push – Triggers page

Changing the push configuration on the concentrator may cause problems. It is recommended to do push configuration from the metering system to ensure both system and concentrator have the same configuration data.

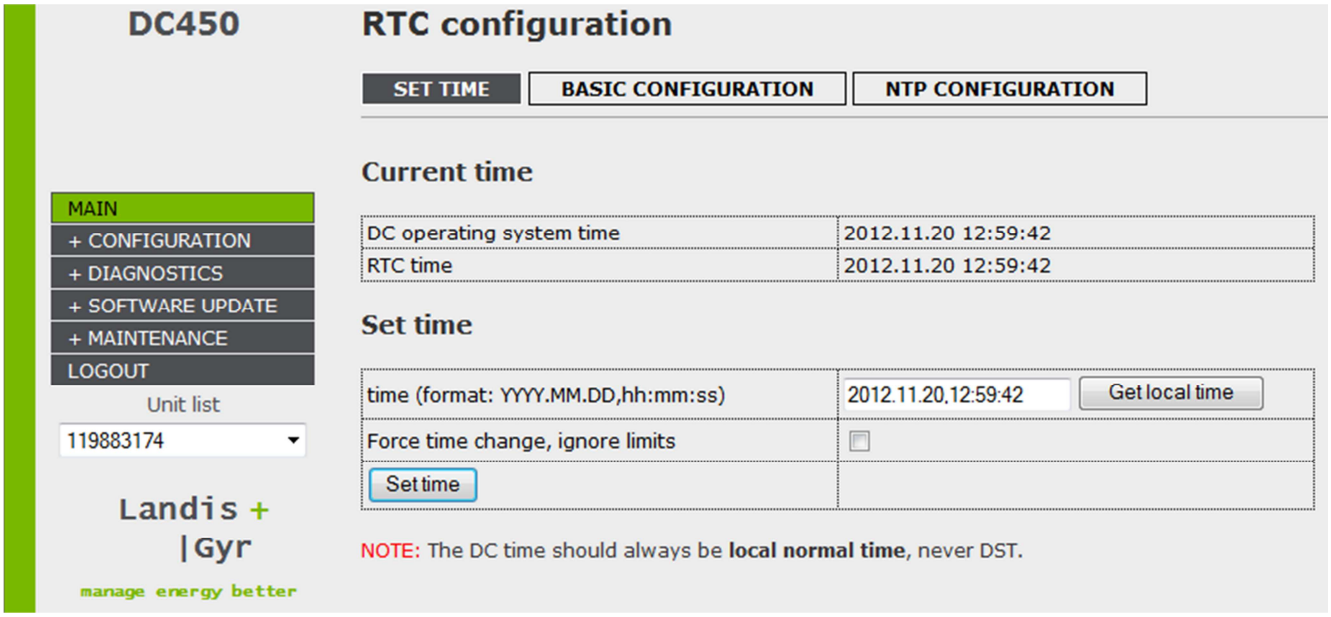

Figure 22. Configuration – RTC – Set time page

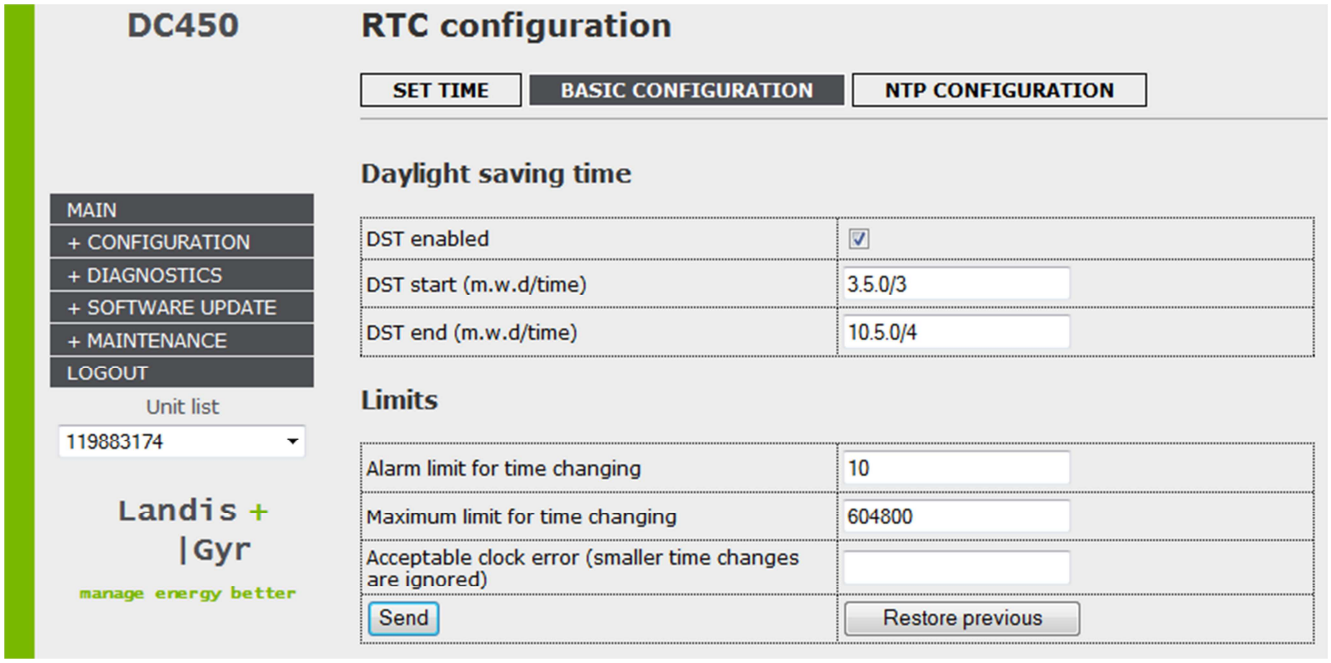

Figure 23. Configuration – RTC – Basic configuration page

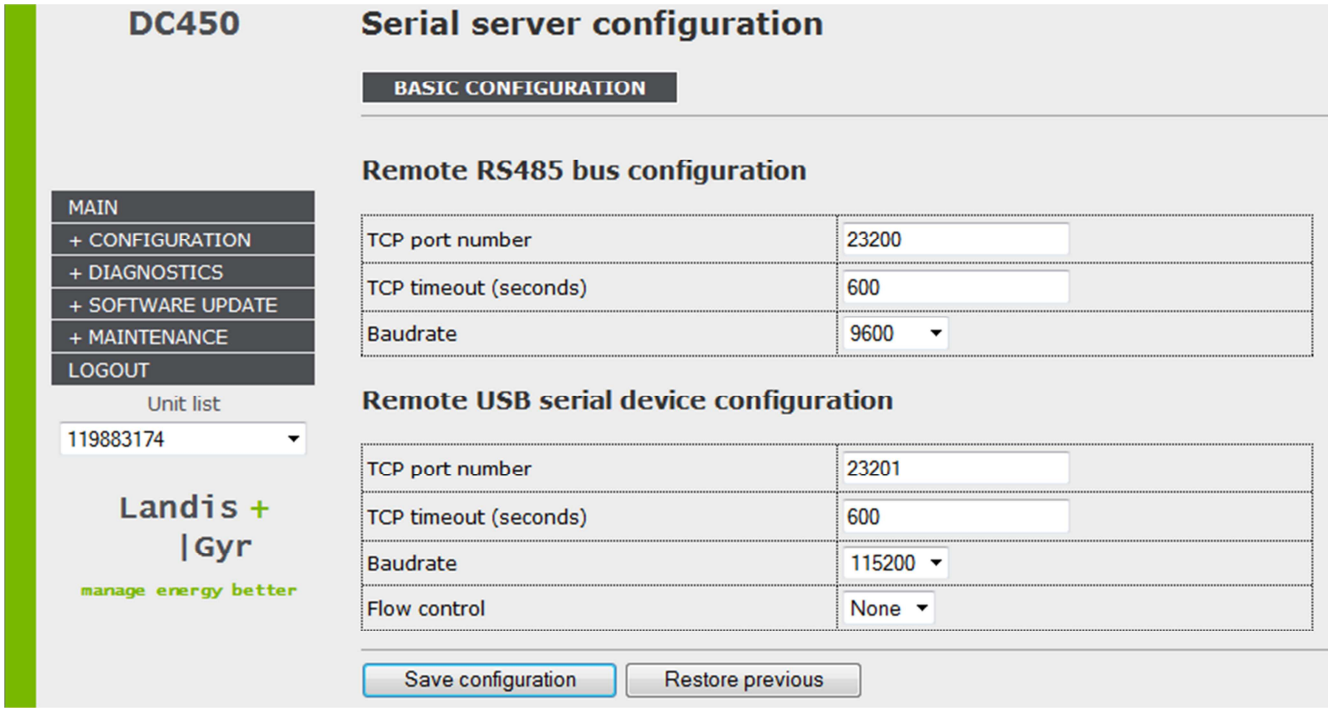

Figure 24. Configuration – Serial server – Basic configuration page

Usage of the serial server depends on the devices supported by the system.
For E650/S650 devices, Remote RS-485 bus configuration settings typically are as follows:

- TCP port number: 23200
- TCP timeout (seconds): 600
- Baudrate: 9600

DC450 supports active alarms received from S650 devices from SW version 1.4.0 onwards. Any events triggering an alarm in S650 shall be transferred to the Head-End System with minimum delay between the event and notification to the operator.

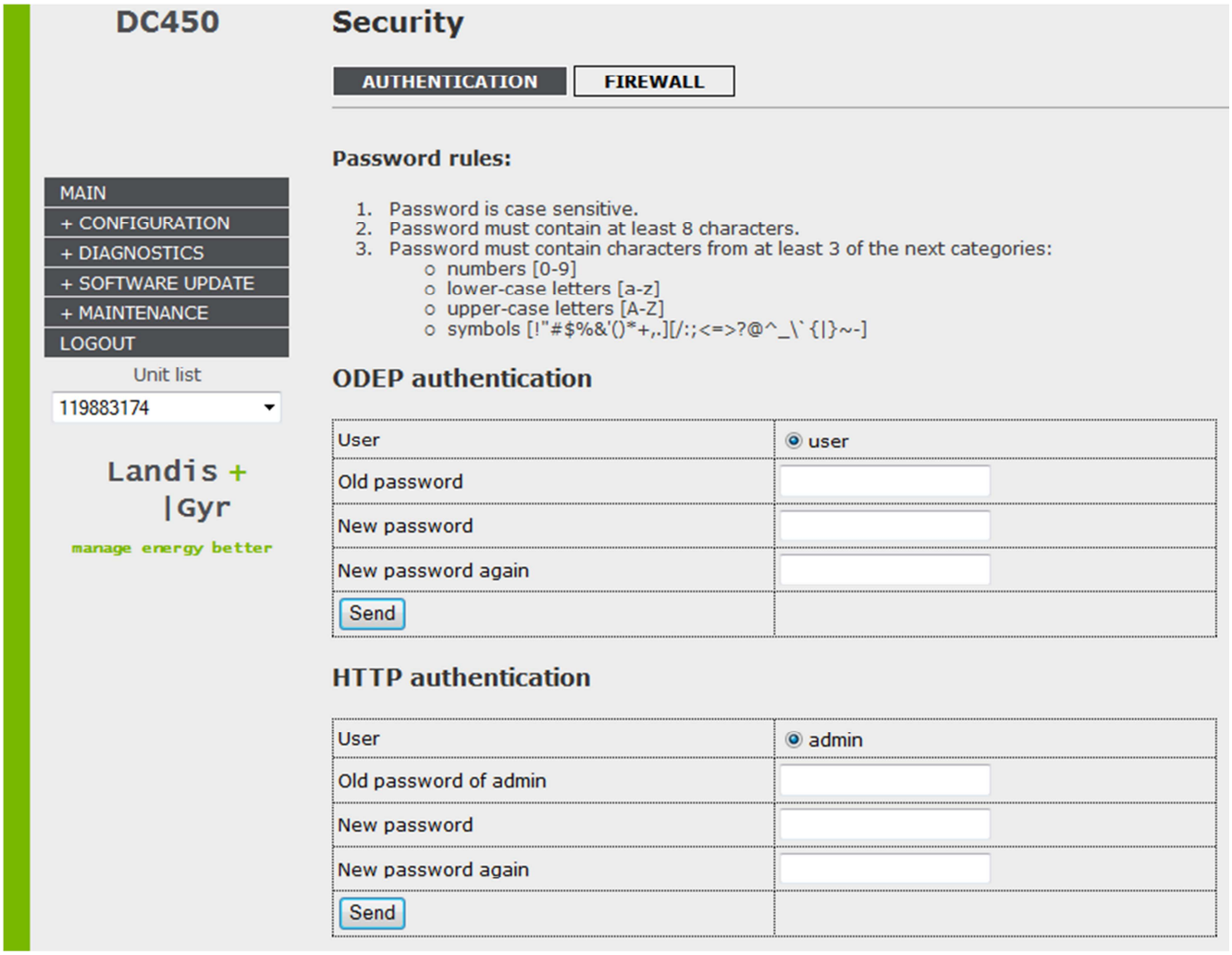

Figure 25. Configuration – Security – Authentication page

Protocol passwords can be changed though the Head-End System or the web interface. The passwords are case sensitive and must contain at least 8 characters. They must also contain characters from at least 3 of following four categories:

- Numbers [0-9]
- Lower-case letters [a-z]
- Upper-case letters [A-Z]
- Symbols [!"#$%&'()*+,.][/:;<=>?@^_\`{|}~-]

Default usernames and passwords:

Username	Password	Description
admin	QL@K1Thl	HTTP authentication (DC web interface).
user	IVM08cd-K8of	ODEP authentication (ODEP server).

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10.4 Diagnostics

The DC450 web interface diagnostics menu displays information on the concentrator's:

- DC logs
- DC profiles
- Uplink statistics
- PLC statistics
- Unit data
  - Units registered to the concentrator
  - Unit's serial data, load profiles, time and event logs

Unit metering data is only available for diagnostics. It can be viewed on the Diagnostics/Unit data pages, but not exported for local reading.

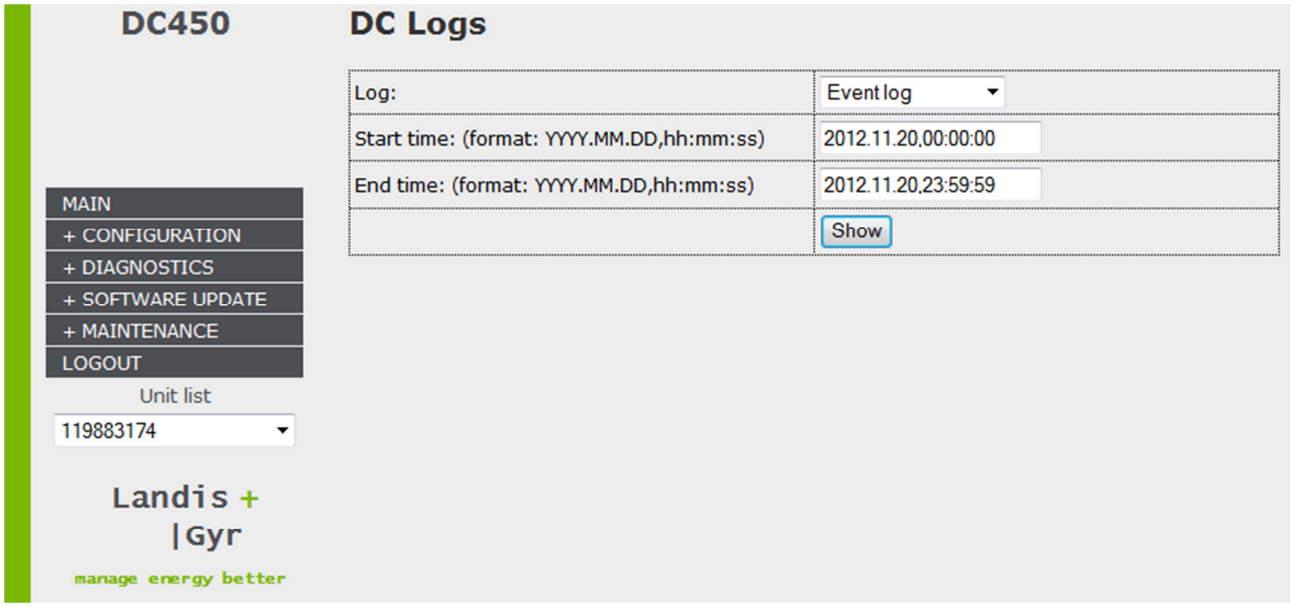


Figure 26. Diagnostics – DC Logs page

On the DC Logs page, you can search the Event, Unit change, Modem, Push and Active alarm logs by date and time range. By default, the DC records the last 1 000 active alarms in the active alarm log. Active alarms are only available in concentrators equipped with PLAN+.

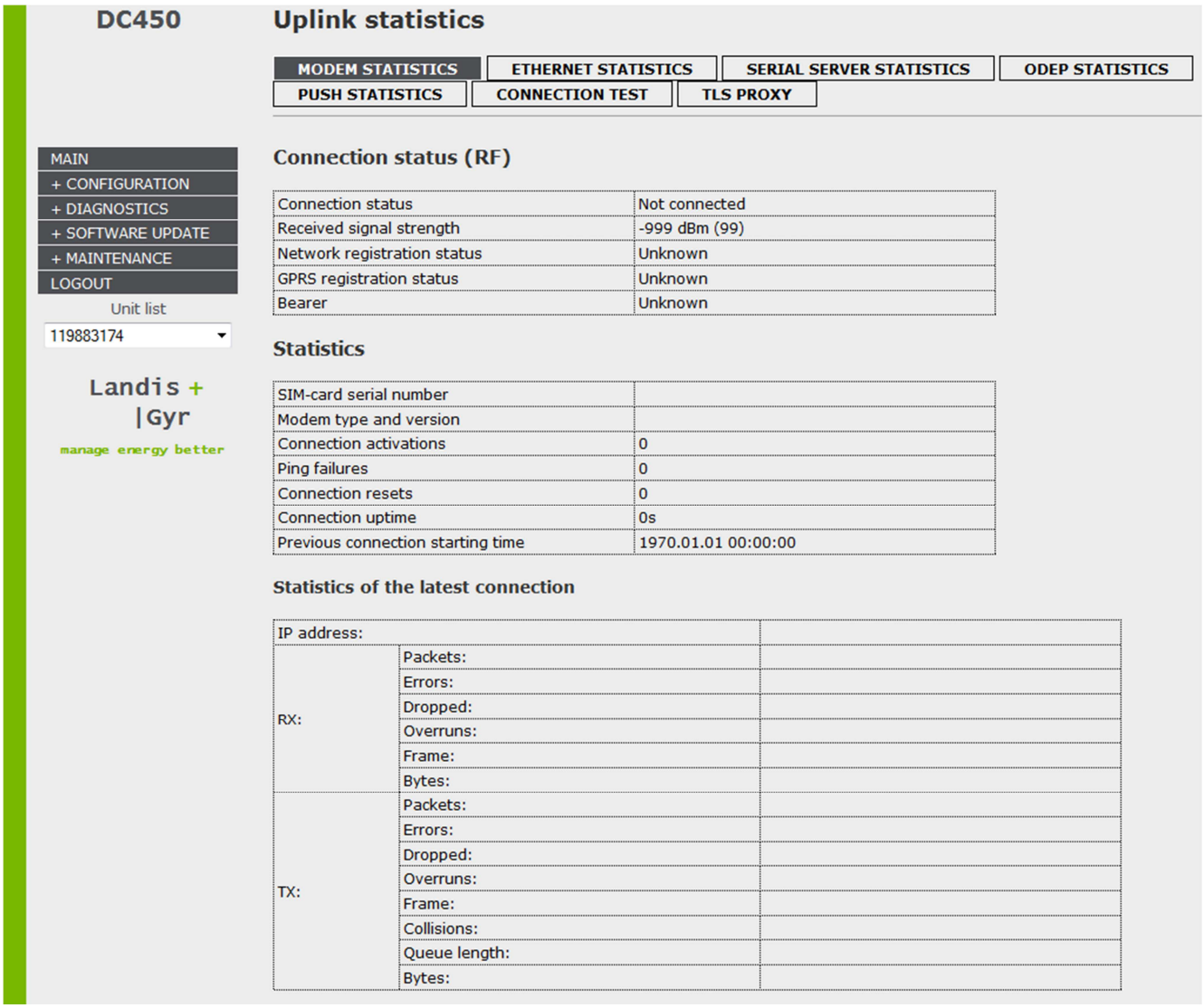


Figure 27. Diagnostics – Uplink – Modem statistics page

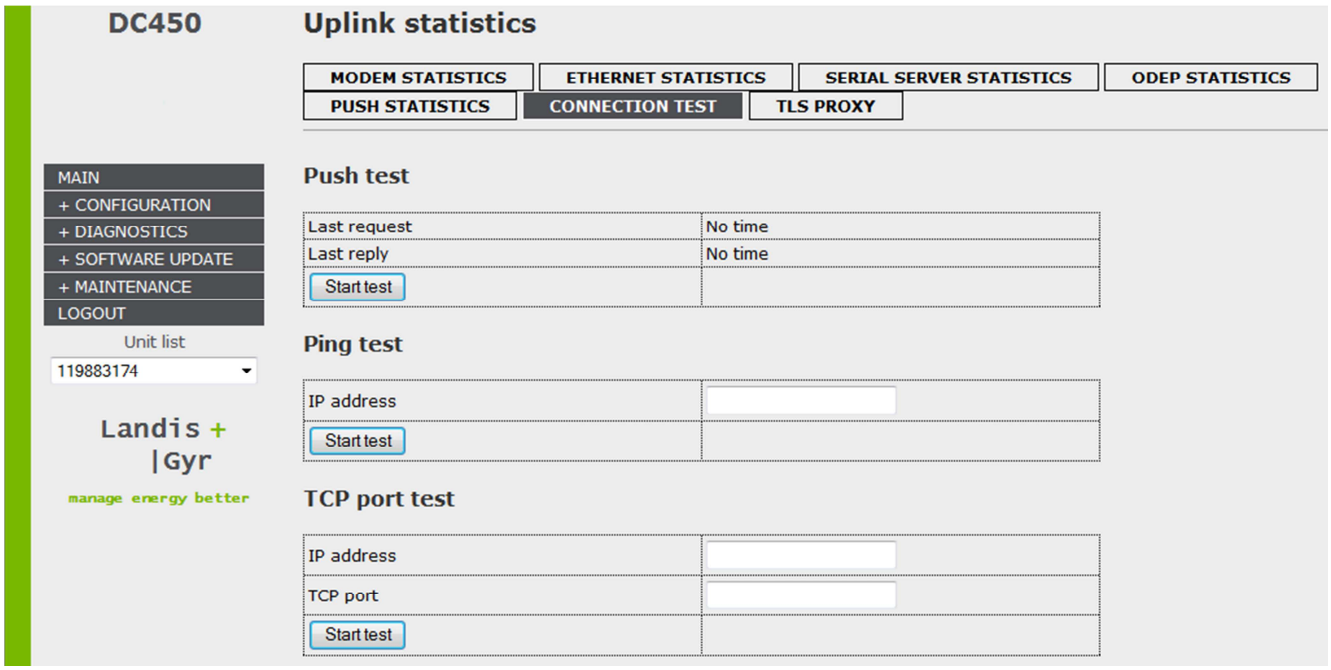


Figure 28. Diagnostics – Uplink – Connection test page

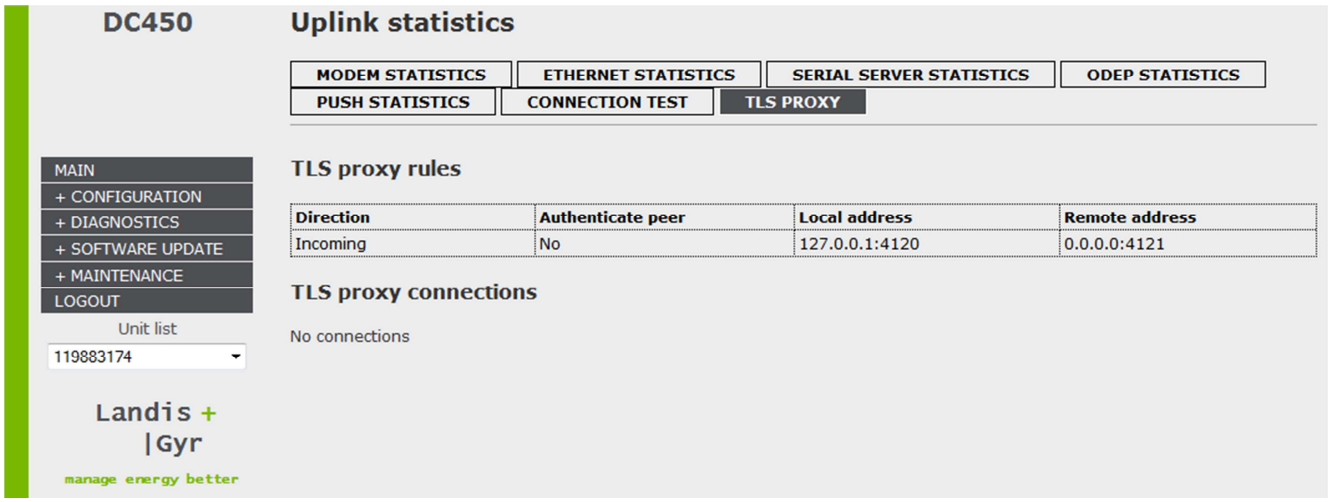


Figure 29. Diagnostics – Uplink – TLS proxy page

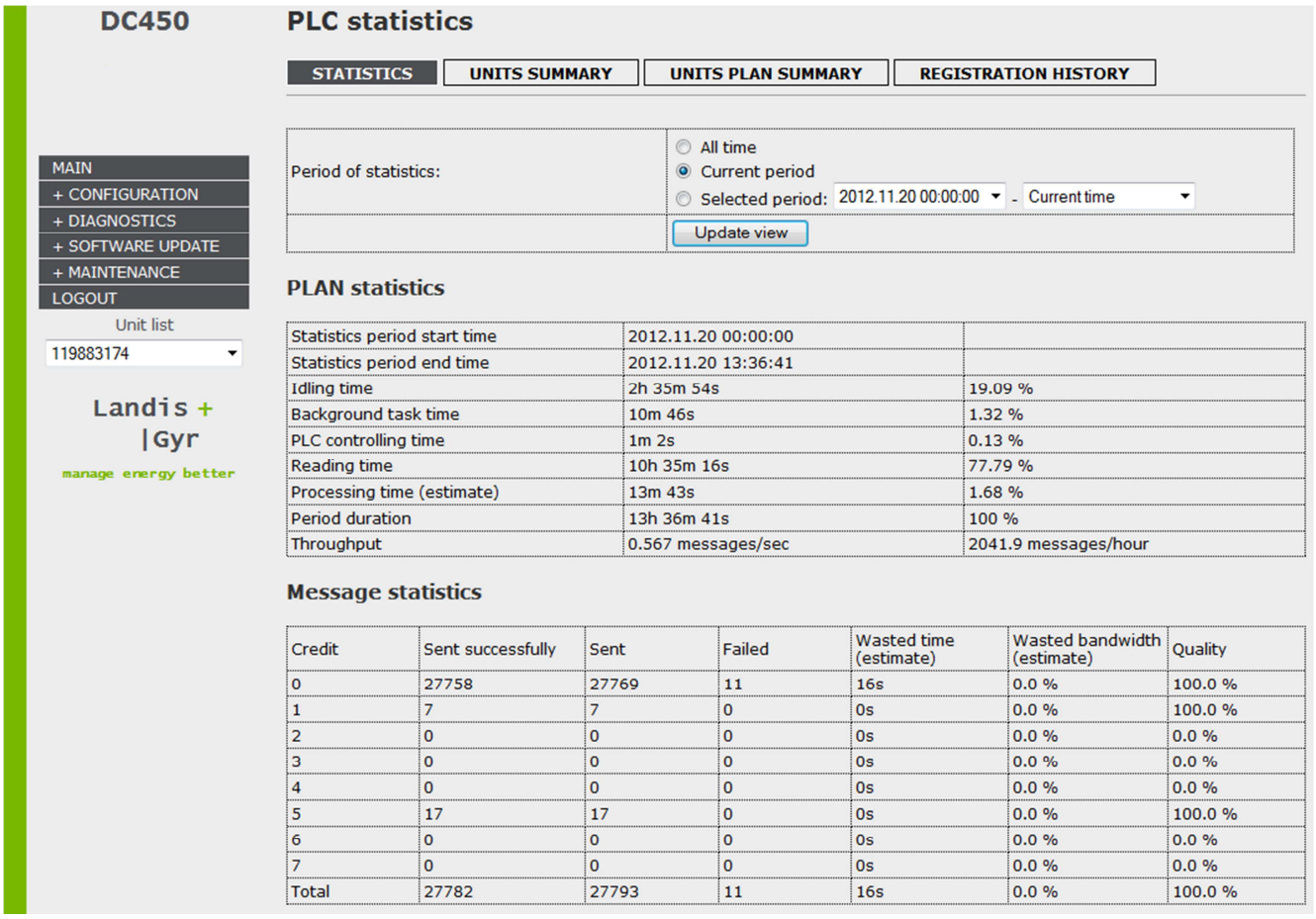
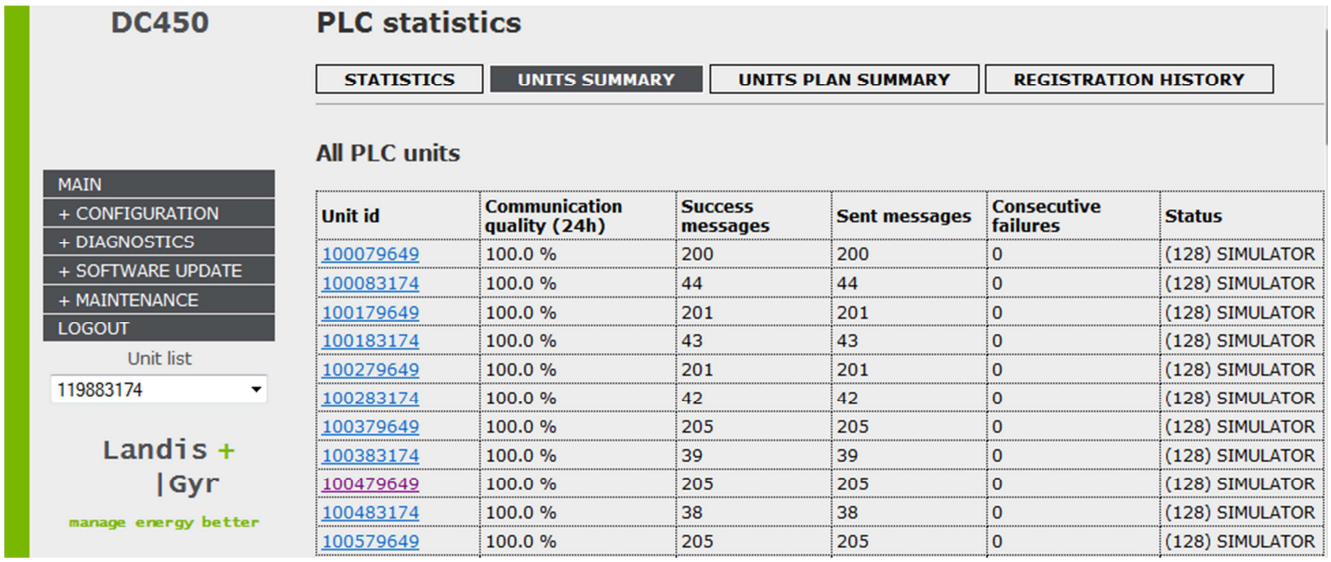

DC450
PLC statistics
STATISTICS
UNITS SUMMARY
UNITS PLAN SUMMARY
REGISTRATION HISTORY
MAIN
+ CONFIGURATION
+ DIAGNOSTICS
+ SOFTWARE UPDATE
+ MAINTENANCE
LOGOUT
Unit list
119883174
Landis + Gyr
manage energy better
Period of statistics:
All time
Current period
Selected period:
2012.11.20 00:00:00
Current time
Update view
PLAN statistics
Statistics period start time 2012.11.20 00:00:00
Statistics period end time 2012.11.20 13:36:41
Idling time 2h 35m 54s 19.09 %
Background task time 10m 46s 1.32 %
PLC controlling time 1m 2s 0.13 %
Reading time 10h 35m 16s 77.79 %
Processing time (estimate) 13m 43s 1.68 %
Period duration 13h 36m 41s 100 %
Throughput 0.567 messages/sec 2041.9 messages/hour
Message statistics
Credit | Sent successfully | Sent | Failed | Wasted time (estimate) | Wasted bandwidth (estimate) | Quality
0 | 27758 | 27769 | 11 | 16s | 0.0 % | 100.0 %
1 | 7 | 7 | 0 | 0s | 0.0 % | 100.0 %
2 | 0 | 0 | 0 | 0s | 0.0 % | 0.0 %
3 | 0 | 0 | 0 | 0s | 0.0 % | 0.0 %
4 | 0 | 0 | 0 | 0s | 0.0 % | 0.0 %
5 | 17 | 17 | 0 | 0s | 0.0 % | 100.0 %
6 | 0 | 0 | 0 | 0s | 0.0 % | 0.0 %
7 | 0 | 0 | 0 | 0s | 0.0 % | 0.0 %
Total | 27782 | 27793 | 11 | 16s | 0.0 % | 100.0 %

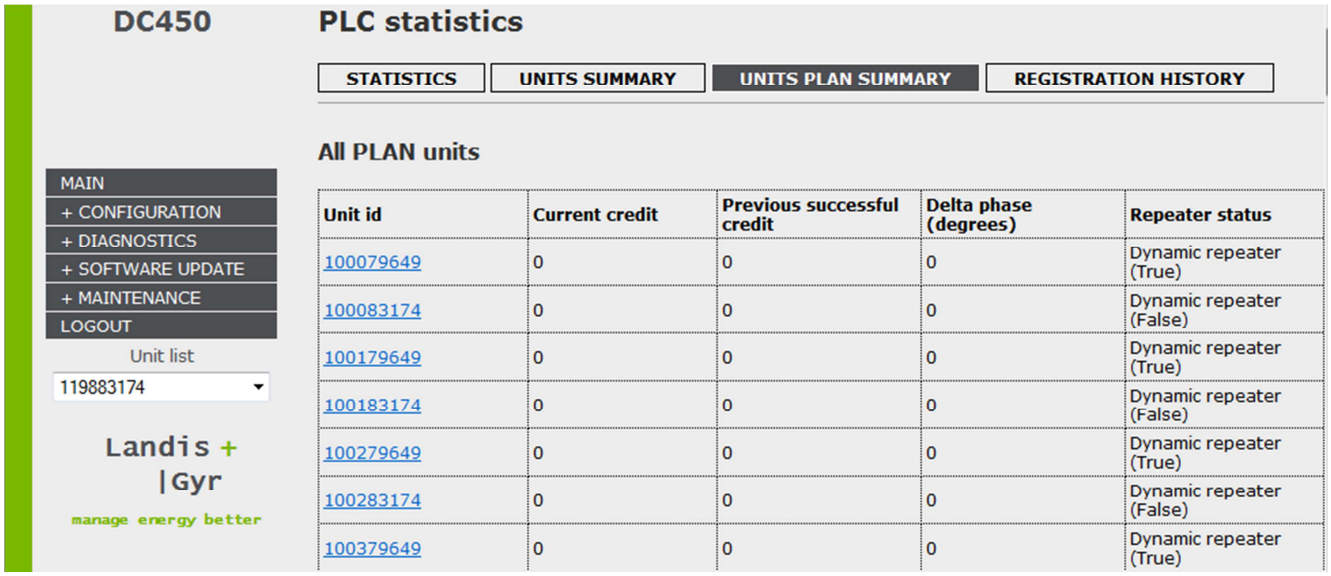
Figure 30. Diagnostics – PLC – Statistics page

The Diagnostics PLC menu offers you a variety of pages where you can display PLC statistics. On top of the PLC statistics page (see *Figure 30* above), you can specify the time period(s) for which you want to display statistics. The options available are All time, Current period or Selected period. The concentrator takes a snapshot of PLC statistics every day at midnight, and the Selected period drop-down menus allow you to display one or more of these snapshot periods.



Unit id	Communication quality (24h)	Success messages	Sent messages	Consecutive failures	Status
100079649	100.0 %	200	200	0	(128) SIMULATOR
100083174	100.0 %	44	44	0	(128) SIMULATOR
100179649	100.0 %	201	201	0	(128) SIMULATOR
100183174	100.0 %	43	43	0	(128) SIMULATOR
100279649	100.0 %	201	201	0	(128) SIMULATOR
100283174	100.0 %	42	42	0	(128) SIMULATOR
100379649	100.0 %	205	205	0	(128) SIMULATOR
100383174	100.0 %	39	39	0	(128) SIMULATOR
100479649	100.0 %	205	205	0	(128) SIMULATOR
100483174	100.0 %	38	38	0	(128) SIMULATOR
100579649	100.0 %	205	205	0	(128) SIMULATOR

Figure 31. Diagnostics – PLC – Units summary page



Unit id	Current credit	Previous successful credit	Delta phase (degrees)	Repeater status
100079649	0	0	0	Dynamic repeater (True)
100083174	0	0	0	Dynamic repeater (False)
100179649	0	0	0	Dynamic repeater (True)
100183174	0	0	0	Dynamic repeater (False)
100279649	0	0	0	Dynamic repeater (True)
100283174	0	0	0	Dynamic repeater (False)
100379649	0	0	0	Dynamic repeater (True)

Figure 32. Diagnostics – PLC – Units PLAN summary page

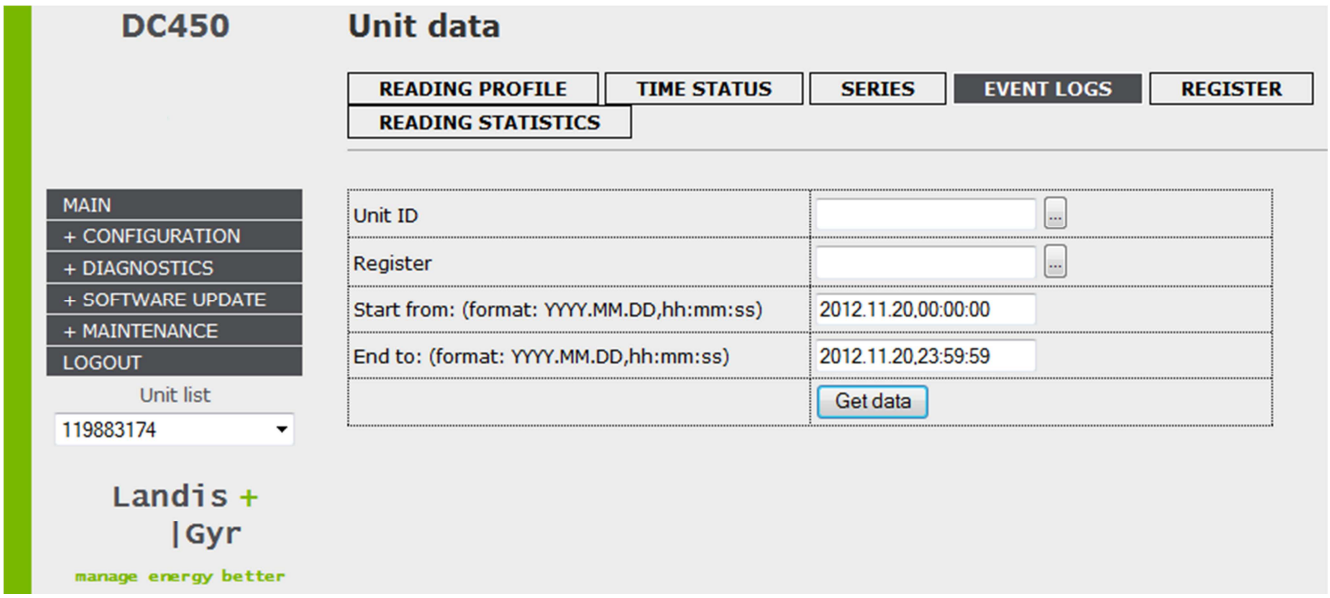


Figure 33. Diagnostics – Unit data – Event logs page

From the Unit Data menu, you can retrieve a specific unit's Reading profile, Time status, Series, Event logs as well display the unit's Reading statistics, i.e. duration and time of the latest reading cycle.

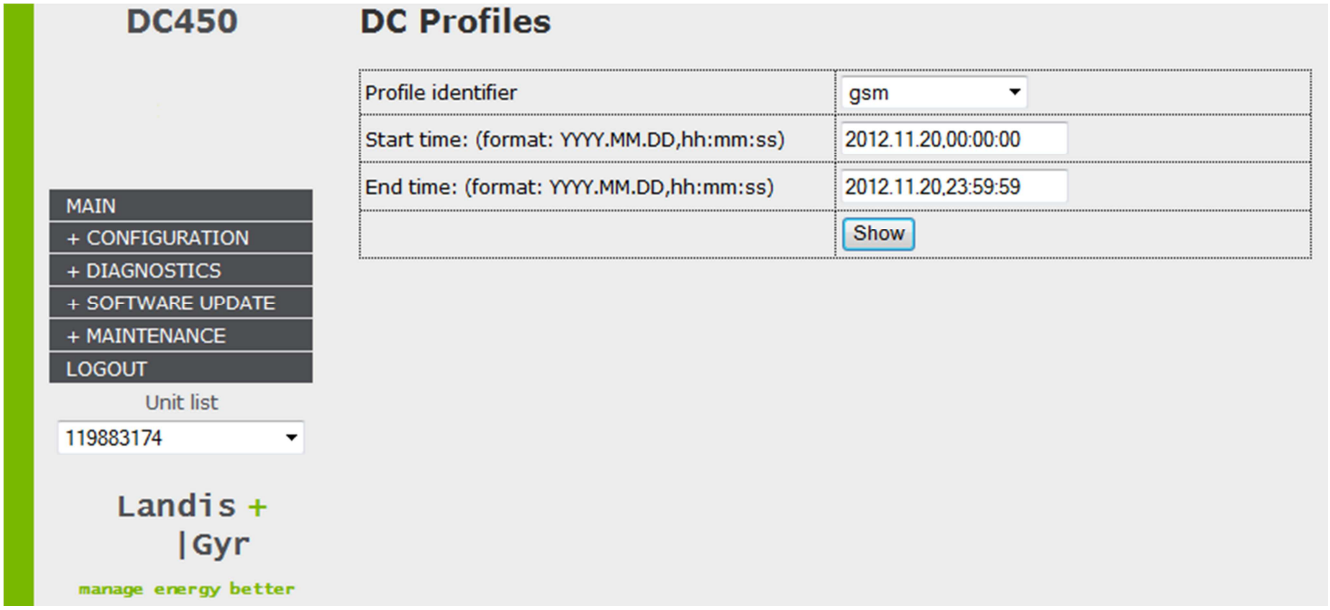


Figure 34. Diagnostics – DC profiles page

DC profiles page allows you to display DC profiles by profile identifier.

10.5 Software update through the web interface

The web interface software update menu displays the concentrator's version history. The concentrator software can also be updated locally through this menu, but it is recommended to use the update functionality in Device Management, see *Device Management User Manual*. The metering system can update several concentrators at the same time.

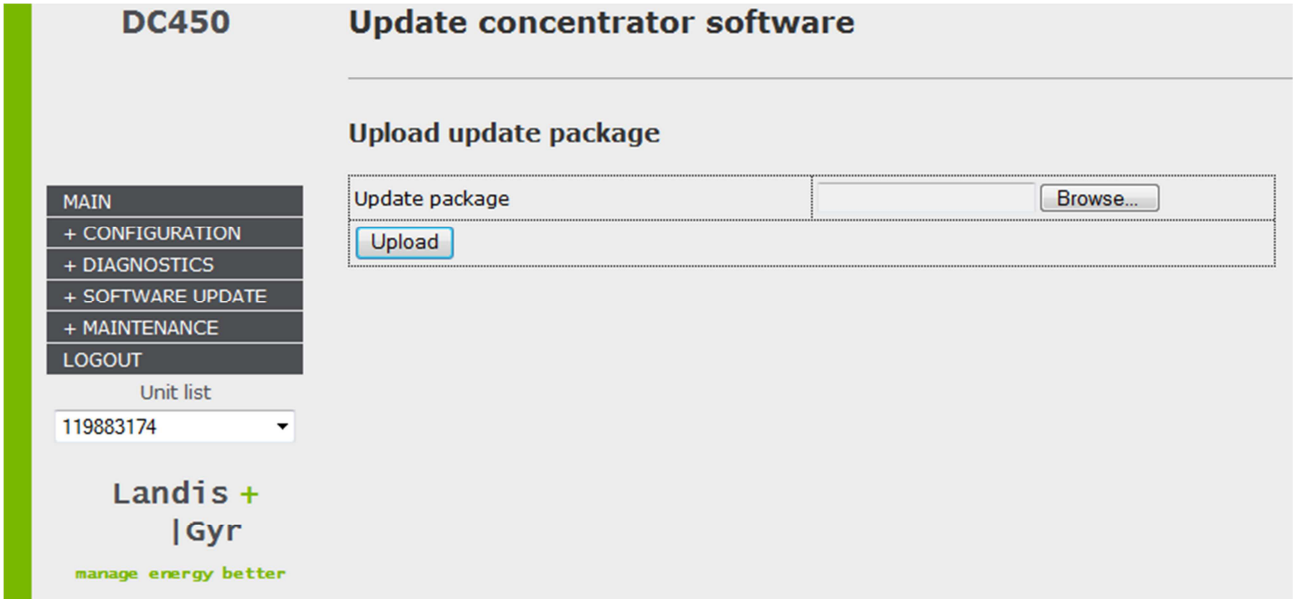


Figure 35. Software update – SW Update page

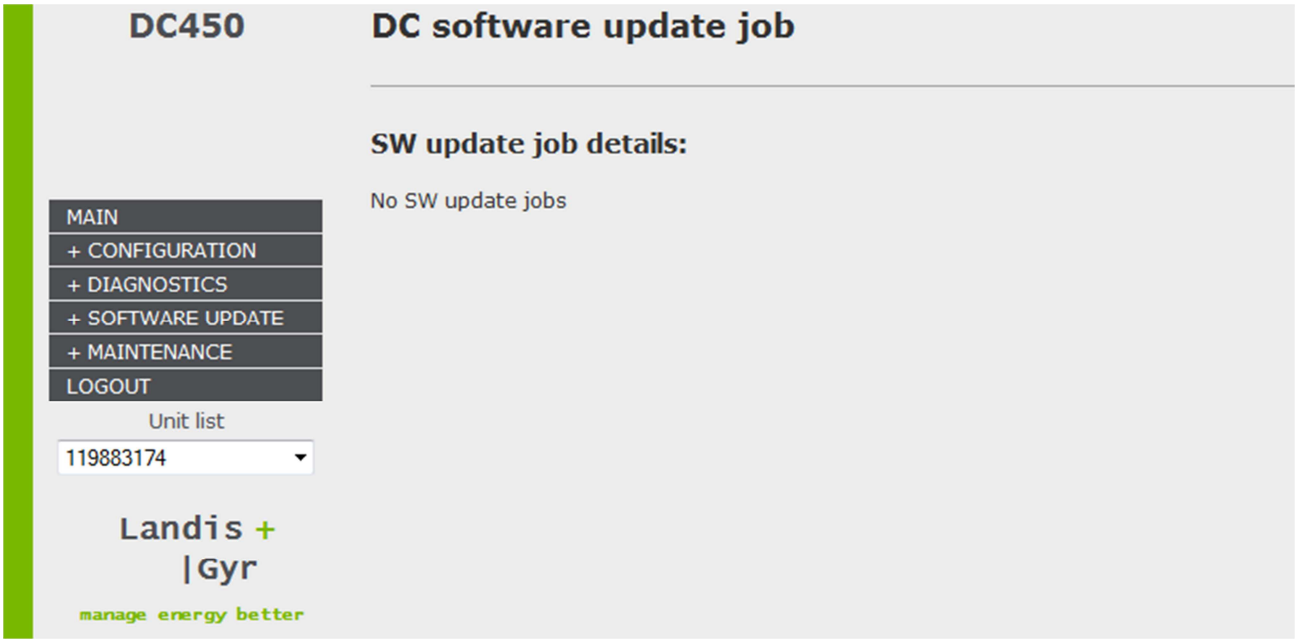


Figure 36. Software update – SW Update job page

SW Update job page shows the details of the software update job downloaded from the system to the DC. This enables you to confirm that the update package has been downloaded to the DC.

11 Maintenance and troubleshooting

11.1 Maintenance

The DC450 concentrator does not contain components that are maintained by the user.

The device software can be updated either remotely from a metering system or locally via web interface.

Warning!
Do not open the case when the device is connected to the electricity network. Life hazard.

11.1.1 Concentrator software update

There are several update methods for DC450 software:

- Update through the Gridstream system
- Web interface
- Update package download from HTTP or FTP server

The update process through the Gridstream system is described in the *Device Management User Manual*.

See Chapter *10.5 Software update through the web* interface, for more information on updating DC450 through web interface.

11.1.2 Changing the communication module

The communication module must be disabled before it can be changed on the concentrator. Removing the module before it is disabled can cause malfunction of the DC and corrupted data.

1. Connect to the concentrator's web interface either through LAN or GPRS.
2. First select **CONFIGURATION** and then **GSM** in the Main Menu on the left. The **GSM CONFIG** page is displayed.
3. Select **Disabled** and click **Send**.
4. Click **Restart**.
5. Remove the disabled module and replace it with a new one.
6. Activate the new module on the web interface.

- Go to the **GSM CONFIG** page in web interface.
- Select **Static GPRS** and click **Send**.

7. Click **Restart**.

If you use the same SIM card, the procedure is the same when replacing a 2G module with a 3G one. If you use a different SIM card with a different IP address, the new IP address must be configured in the Gridstream system.

11.2 Troubleshooting

11.2.1 No GSM/GPRS/UMTS connection to the DC450

If a DC450 GSM/GPRS/UMTS communication does not work, check the following:

- Is the GSM/UMTS signal strength sufficient?
- Is the SIM card properly installed?
- Is the SIM card's PIN code request (GSM data only) switched off?
- Is the GPRS configuration correct?
- In case of a 3G module, are the required radio bands active?
- Is the communication module operating?

See Chapter *5.2.5 Checking the signal strength* and *5.2.6 Checking GSM/GPRS/UMTS operation*. If all of the above conditions are OK, check with your operator that your service is correct and operational.

12 Decommissioning and disposal

The components used to manufacture the device can, in the main, be broken down into constituent parts and sent for suitable recycling or disposal. When the product is removed from use, the whole product must be sent to a professional electronic waste treatment process. The waste treatment company must be accepted by the officials.

End processing of the product and recycling of its components must always be carried out in accordance with the local laws and instructions given by the officials of the country where the end processing and recycling are done.

By request, Landis+Gyr will give more information about the environmental influence of the product.

This product must not be disposed of in regular waste. Use a professional electronic waste treatment process.

The following are general guidelines and should NOT take priority over local disposal and environmental policies which should be adhered to without compromise.

Component Parts	Disposal
Printed Circuit Boards	Electronic waste: disposal according to local regulations.
Metal Components	Sorted and delivered to collective recycling point.
Plastic Components	Sorted and delivered for re-granulation if at all possible.

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13 Terms and abbreviations

The following terms and abbreviations are used in this document.

Term	Description
2G Module	GSM/GPRS Module.
AMR	Automated Meter Reading. Refers to systems that are responsible for handling tasks that require communication with metering devices, for example reading of metering values. See HES.
APN	Access Point Name (APN) is the name of an access point for GPRS.
CSV	Comma Separated Value.
DC	Data Concentrator.
GPRS	General Packet Radio Service (GPRS) is a packet-based wireless communication service that provides data rates from 56 up to 114 Kbps. It also offers a continuous connection to the Internet for mobile phone and computer users.
Gridstream AIM	Landis+Gyr's Advanced Metering Management (AMM) system that includes applications for Automated Meter Reading (AMR) and Metering Data Management (MDM).
HES	Head-End System for automated meter reading. See AMR.
HTTP	Hypertext Transport Protocol (HTTP) is the communication protocol used by the World Wide Web.
MDM	Metering Data Management. The metering database and metering data processing system of Gridstream portfolio is also known as Ware.
PIN	Personal Identification Number (PIN) is a code asked by the SIM card to authenticate the user.
PLAN	Power Line Automation Network.
PLC	Power Line Communication.
SIM	Subscriber Identity Module (SIM) securely stores the service-subscriber key (IMSI) used to identify a subscriber on mobile telephony devices (such as computers) and mobile phones.
SMS	Short Message Service (SMS) is a pager-like service for GSM mobile phones that allows the sending and receiving of alphanumeric messages.
TCP/IP	Transmission Control Protocol/Internet Protocol (TCP/IP) is the suite of protocols used to connect hosts on the Internet.
USB	Universal Serial Bus (USB) is a serial bus standard to interface devices to a host computer.
WAN/LAN	Wide Area Network/Local Area Network.
Ware	See MDM.

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